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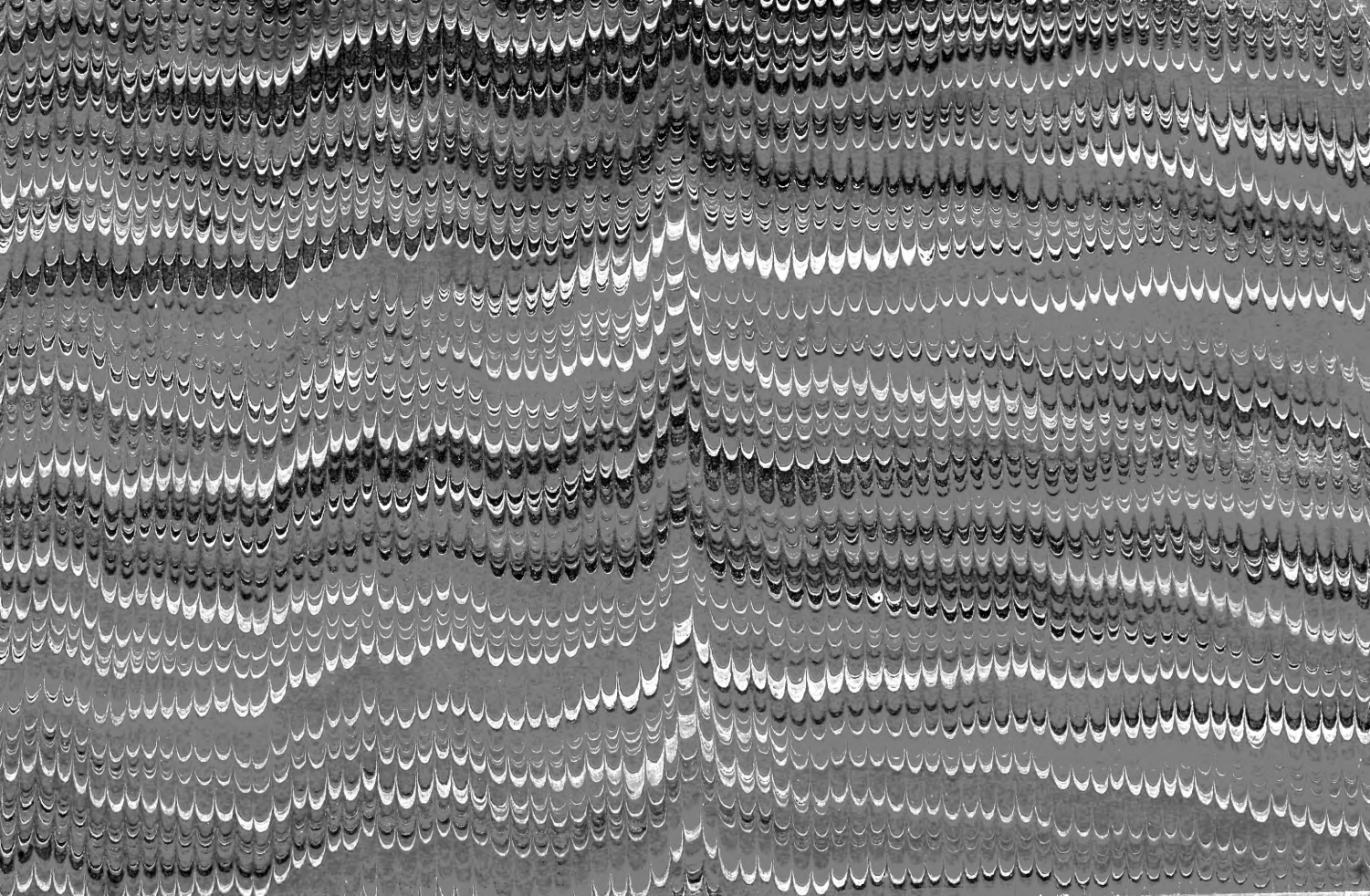

TREATISE

AND

HAND BOOK

ON

ORANGE CULTURE

IN

FLORIDA.

BY

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FRUIT COVE, FLA.

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PREFACE.

The writer for several years suffered greatly for want of some reliable advice on Orange Culture. Could he have had such instructions as the following pages contain he might have hastened forward to profitable bearing by several years an orange grove now crowning his labors with success. He could have done this with half the amount of money expended by him in experimenting, in following unreliable advice, and in doing, what at the time, seemed wisest. It is to save others such useless expenditures and to help forward the best material interest of Florida that he has undertaken to give to the public the result of his experience and observation on ORANGE CULTURE IN FLORIDA.

Nor has he undertaken this without the earnest solicitation of many who are engaged in orange growing and have witnessed his success and discussed with him his plans.

The writer has not only had ten years of actual experience in orange growing, but he has had before him a wide field for observing the efforts of others engaged in this business. He has had throughout his life a passion for horticulture; in early life considerable experience as an amateur cultivator of fruits. For twenty-five years he has been accustomed to eat fresh from the trees the orange grown in Cuba, in Central America, in California, in Louisiana and in Florida. His admiration of this "queen of fruits" has led him to observe and inquire after the methods of culture in each of these several countries. During the ten years of his experience he has frequently traveled over the State of Florida, visiting, at all seasons of the year, the various sections engaged in growing oranges, discussing with growers their theories and noting the results of their efforts.

This little work, therefore, is not the result of the experience of a single individual confined to a single location, but the result of experiments, successes and failures of the many, extended over the State of Florida.

The Press of Florida has done much to help forward to a knowledge necessary to success in orange growing in this State. Its appreciation of this great interest, and the readiness with which it has devoted its columns to growers for the interchange of thought and the discussion of theories, both false and true, have given to persons widely separated the benefit of each others' experience. For this work, the Press of Florida, and especially the *Agriculturist* and the *Semi-Tropical*, as more especially devoted to this interest, is deserving all praise, and whosoever would keep up with the rapidly growing knowledge of orange culture in our peculiar climate and soil must continue to read, as the Press will continue to publish, every new light on this subject. The Author here makes acknowledgments to the Press of Florida as well as to the thousands whom he has visited, and with whom he has discussed the contents of these pages.

All technical terms, as far as possible, have been avoided in these pages. Where such terms have been employed it has been solely to make the meaning less questionable. This book is intended as a Manual for all who wish to best succeed with the least expense in growing the orange. Such terms as can be understood by the unlearned can be also comprehended by those who can command encyclopedias and the elaborate work of Gallesio.

With earnest desire for the success of the orange grower in Florida and with hearty good will to them and to others who may engage in this honorable and profitable business, this humble and little book is submitted by the

AUTHOR.

ORANGE CULTURE.

CHAPTER I.

THE PROFIT OF ORANGE GROWING,

When compared to the profit arising from other kinds of business, is so large that a statement of facts is often withheld because the truth seems fabulous to those who have only had experience in the cultivation of other kinds of fruits. Those engaged in the business consider each tree, so soon as it is in healthy and vigorous bearing, worth one hundred dollars. Indeed the annual yield of such a tree will pay a large interest on the one hundred dollars—from ten to an hundred and in some instances one hundred and fifty per cent. per annum. Now if we take into consideration that from forty to one hundred trees are grown on an acre, the yield is immense. In the quiet country, breathing its pure atmosphere, with fresh fruits and vegetables from January to January, with milk, butter, honey and poultry, the product of his farm, and accessories to his grove, the man who has once brought his trees into successful bearing, can enjoy all these and much more besides, having at his command an income quite equal to that commanded by owners of blocks of well improved real estate in our towns and cities, with not one-tenth part of the original cost of city investments. Or, if the owner chooses, he is at liberty to go abroad without fear of the incendiaries' torch, or the failure of commercial firms. And even if a frost should come severe enough to cut down full grown trees—and but one such frost has come in the history of Florida—the owner of such a grove has but to wait quietly for three years, and out of the ruin will come a second fortune as large as the first, and without the cost of brick, mortar and workmen.

The age to which the orange tree lives, from three hundred to four

hundred years, is so great that Americans do not know how to consider it in the light of a *permanent* investment. The fear has sometimes been expressed that the business will be overdone, that the supply will after a while exceed the demand and the price of the fruit so decline that the orange will be unprofitable to the grower. But those who entertain this fear have certainly not considered the facts. That portion of the States, with climate suitable for growing the orange, is comparatively small. The southern portion of California, a very small part of Louisiana and the whole of Florida if devoted to orange culture is but a trifle compared to the vast sections of the United States which will be well filled with inhabitants long before the orange growing sections can be brought into bearing. The present yield of fruit grown in the United States furnishes hardly one orange a year to each inhabitant. Our population will likely double, judging the future by the past, in the next thirty or forty years. To furnish such a population with one orange or lemon a day will require no less than thirty thousand millions of oranges or lemons per annum. The skill in gathering, curing and packing the late and early varieties now appearing will enable the grower to furnish for the market at all seasons of the year either oranges or lemons. The wholesomeness of the fruit, together with its medicinal qualities, will increase its popularity as an article of food, until it will be universally used. At present the production of Florida oranges is so small that it is not known in the markets of many of our largest cities. The foreign varieties offered in those markets, even when fully ripe and eaten fresh in their own countries, will not compare with the Florida orange. But in order to reach this country in sound condition they have to be gathered when green and hence are not only unpalatable but unwholesome. When the Florida orange becomes generally known, and the supply is adequate, it will exclude these foreign varieties and, because of its excellence, become univerally used. Such will be the demand.

Now note the possibility of supply. Only a small proportion of those sections with climate sufficiently mild to grow the orange can ever be made available. The long, dry seasons of California prevent the possibility of growing this fruit in that State except by irrigation, while the estimated yield per tree is only six hundred oranges. In

Louisiana the possible area is but small. In Florida the climatic conditions are more favorable, but the land and location suitable are not one hundredth part of the State. Another fact lessens the possibility of yield. Orange culture belongs to the class of *skilled* labor. Hundreds engaged in the business will fail, because success requires intelligence, application, patience and skill. Hundreds have already failed from one or all of these causes, and have left the State, never dreaming that they alone are to be blamed for their failure. Men in the very communities thus abandoned have succeeded because they were more prudent in the selection of soil and location, and used their intelligence and the intelligence of others and persevered in the face of partial failure brought about by ignorance. But those men who failed took no advice except that of the land owner who offered to sell land cheaper than any one else. They read nothing that had been written by men who had succeeded. They took no warning of those who had failed. Stilted on their castle of self conceit they stood, nor deigned to look down to the humble but *prudent* laborer for advice, till their castle fell and they left the State imagining that the "Sand of Florida" had proven an unstable foundation and overthrown them and their castle. Such instances will repeat themselves. Whoever may succeed, such men will fail. Whatever may be written and wisely written on the subject, and however published, whether in book or journal, will not be read by them. But while the above facts will lessen the general yield of oranges, it will make the business vastly more profitable to the men who possess the virtues necessary to success. The orange will pay beyond any other fruit, at half a cent an orange on the tree. In Europe, where lands are exceedingly high, a grove is considered a most profitable investment even when the fruit sells from two dollars to four dollars per thousand. Ten years ago the Florida orange was considered well sold when the grower could get one cent on the tree. Few now sell for less than one and a half cent, and some average at their groves as high as four cents per orange, and the price still advances.

In no business can a young man with pluck, intelligence and application, so certainly lay the foundation for a competency and fortune as in orange growing in Florida. With the exercise of these he may in ten years be what the country could call a rich man.

A young man from Middle Florida borrowed money enough from his father to buy a piece of land. After paying for his land, located a few miles above Palatka, he landed in Palatka with three dollars in his pocket. These he paid for provisions and went to work growing vegetables on about an acre and a half of cleared land. Six years afterward he sold his place for twelve thousand dollars cash, without owing a cent for anything. Many instances could be given of young men, as well as old men, who have done as well, and of some who have done still better. Young men have frequently written to the author to aid in securing for them a clerkship. His advice has been invariably given "Go to work raising fruit in Florida and be *independent* and *have a home.*"

CHAPTER II.

OF THE SEVERAL METHODS OF PLANTING ORANGE GROVES

The question is frequently asked, "Which is the best?" The several methods are, 1st, the budding of the wild sour trees without moving them; 2d, budding them first and planting afterwards in some suitable location; 3d, planting the sour stumps and budding afterwards; 4th, growing the trees from sweet seed without budding; 5th, planting the sweet seedling and budding either before or after removal from nursery; 6th, budding on sour seedlings either before or after removal from nursery, and 7th, a grove of sweet seedlings.

Each of these plans has some advantage over the others. They all have advocates; but which of all has the greatest number of advantages, is questionable. I have tried them all, but, after stating the advantages of each, must leave to the grower to select for himself as circumstances and inclination may control.

If one is impatient for return, let him choose the sour grove, if he can find it, and bud the trees where they stand. With proper management he may begin to gather in two years. If he is still impatient but cannot find a sour grove, let him buy the sour stumps, plant them in some suitable location, and he may begin to gather fruit in three years from planting. But if he can wait awhile longer for fruit with the hope of getting a longer lived tree and more abundant yield, let him plant *younger* trees, either seedlings or budded stock. If he wishes an early bearer and comparatively smaller tree, he can select the *sour* seedling budded. If a larger but later bearer, he can select the *sweet* seedling budded. If he wishes an abundant yield and the largest trees, and can wait a longer time, the sweet seedling, unbudded, will suit. With good treatment such trees will begin to yield in eight years, and, after a longer time, in ninety-nine cases out of a hundred, give him a fair quality of fruit; but perhaps he will have as many varieties or sub-varieties as trees in his grove. The sour stock for a few years grows more rapidly, but will finally make a smaller tree than the sweet. The best quality of fruit can be insured only by budding from the best varieties.

CHAPTER III.

THE WILD ORANGE GROVE BUDDED

Yields so readily under so simple treatment that we shall consider it at once. Of course nature has already determined the location, and in many instances the location has been wisely chosen, not only with reference to best protection from frost, but also in many instances with reference to cheap and easy transportation, on the banks of navigable rivers and creeks. Wherever a wild grove can be found so located the purchaser can afford to pay a liberal price if he has to buy, or the owner can afford to improve by the most approved methods.

Many, however, have been the blunders made in attempts to improve such valuable property. I know of many groves greatly damaged, and some completely sacrificed by bad management. The two mistakes most frequently made, in the treatment of such groves, are, first, the reckless destruction of the forest trees furnished by nature for the protection of the orange, and second, the continued pulling off the young shoots from the stumps cut off for the purpose of budding. The first and second buds having failed, the cultivator continues to reduce the vitality of the tree by pulling off the young shoots, until at last the sap, for want of elaboration through the leaf, becomes diseased, and the tree, tenacious of life as it is, dies of the double cause of exhaustion and disease. It may be well to caution the orange grower at once against the commission or repetition of this frequent blunder. Few of our forest trees will survive being cut down to a stump, still fewer will survive if the young shoots are kept down for a few months. Every time the young shoots are pulled off, the young rootlets, corresponding to and starting at the same instant with the shoots, die, and the effort of nature to restore vitality is checked and weakened until the hardiest tree is soon killed. In budding *old* stumps I have found it of great advantage to allow a few shoots to grow along the trunk, *below* the bud, pinching back these shoots, allowing a few leaves on each shoot to grow to full size and so furnishing the tree with healthy sap, encourage the development and maturity of new wood and new roots and keep up an active circulation.

Continue this until the sweet bud has so far advanced as to be able to furnish the tree with sufficient leaf to enable it to collect sufficient carbon from the atmosphere to insure the health of the tree. After this point has been reached you may then pluck off all the sour shoots and keep them off. In some instances where a sweet bud has made an early start, a more vigorous growth of the sweet bud may be obtained by plucking off all the sour shoots from the first, but this is at the risk of the health of both the stock and the bud. I will mention one other thing in this connection: do not allow the sweet bud to grow too long before pinching it back. If allowed to grow two or three feet, as it will from a very vigorous stump, it is liable to be broken off by the wind. But even if it should be securely tied so as to prevent such an accident it should, nevertheless, be pinched back in order to hasten the maturity of its own wood and leaves. The *mature* leaves are necessary to the health of both stock and bud, and necessary to gain a controlling influence over the circulation, and to draw it as early as possible to the sweet bud. By this means also the mature wood of the sweet bud is better enabled to resist the blighting influence of both sun and frost. Still another advantage is gained. By pinching back the bud it is induced to branch near its junction with the stock and so enlarge and strengthen its connection with the stock.

I again call the attention of the reader to the other mistake mentioned in the beginnig of this chapter and so frequently made by those who have undertaken to improve wild groves. Nature has not only planted these groves, found above the frost line, on the south side of bodies of water, but has also taken the additional precaution to plant them under the protection of forest trees. Thus, doubly guarded, these orange trees have grown, some of them probably for a century. As the cold winds from the north-west have swept down upon them, the frost has been tempered by passing over a body of water of higher temperature than the winds. The spreading branches of forest trees, hanging like canopies, have checked the radiation of heat passing from the surface of the earth, and enclosed the orange grove in a vapor bath. And even if the tempest has been too strong and cold, and swept away the warm air blanket thrown by nature over the tender orange shoot, and the cold has frozen the sap until the tender woody

tissues have been ruptured, still the forest trees have stood like foster mothers to keep off the rays of the morning sun till these ruptured tissue and sap vessels could be healed by the efforts of nature. The mother, who has suddenly plunged the body of her scalded child into a bath of flour or oil to save the child from suffering and death, has not shown a tenderer care than have the forest trees extended for scores of years over their charges. And yet the first thing done by many of us who wished to *improve* our wild groves was to cut down these natural protectors to a tree. The wonder is, not that so many of these wild groves have been destroyed, but that any have been saved with such abuse.

But we will not now discuss the advantages of partial forest protection. The subject is of too much importance to be dismissed by a single paragraph. We will consider this subject in a separate chapter further along. I have thus early noticed this subject lest the reader may do what I and hundreds of others have done, *destroy* these magnificent wild groves when attempting to improve them.

Before beginning to bud a wild orange grove first cut down all the under brush, and then the smaller forest trees. This rubbish can be removed or burned and the ashes used as fertilizer of the orange trees, spreading a liberal quantity around the trunks to keep off the "wood lice"—white ant—which frequently attack trees where there is much rubbish left on the ground. Or if lime can be had, sprinkle this around the trunks and let the rubbish rot on the ground. The decayed brush will add greatly to the fertility of the soil and will soon be out of the way. It would add, however, greatly to the ease with which you accomplish your work to come after to take all this rubbish out of the way.

The ground cleared of under brush and small trees, pass through and select at suitable intervals the forest trees you wish to remain. Select a plenty of these trees and mark them so that they will not be cut down. If afterward they are found standing too thickly on the ground some of them can be felled. If felled too hastily fifty years cannot restore them. The number of these trees which are to remain is to be determined by circumstances. If the place is well protected by water, fewer trees will answer. But be certain to leave enough

trees to break off the morning sun after a frost, as it is the sudden thawing more than the freeze which kills the trees. Trees intended for shelter should be of habits the opposite of those of the orange. You wish the orange to have low spreading branches. Select as their protectors trees so tall that their lower branches will not interfere with the foliage of the orange. The orange tree sends most of its roots near the surface of the ground. Select as their protectors trees that send their roots deep. I have noticed several varieties of live oak in the State. Only one of these is in the habit of sending its roots deep into the soil. Whenever I have found this variety growing I could plant the orange close to its trunk without damage to the orange. The persimon has this habit of deep feeding, but unfortunately it drops its foliage in the Winter. The pine has this habit only when grown in a well drained soil. There are some individual trees whose habits are an exception to the general habits of the variety. These can soon be discovered by the use of the spade or hoe. But if trees without surface feeders cannot be found, then select trees with other desirable qualities and cut the surface roots by a trench ten or twelve inches deep a few feet from and around the base. After those trees have been selected and marked which you wish to remain, you can now cut next such trees as can be felled without damage to the standing orange trees. The work thus far should be done during the Fall or Winter, so as to be ready for the Spring and Summer work which is to follow.

In early Spring, before the new growth of the orange has started, begin to saw off the limbs, if they branch near the ground, of the orange trees, taking off all the top. If the trunks are long, cut off the tree, leaving about two and a half feet of stump. Immediately following, fell the balance of the forest trees that are to be cut.

So soon as the sap begins to flow freely and the bark break by the springing of new shoots, insert sweet "sprig" buds, ranging from the top to six inches below the top of the stump, inserting four or more buds to the tree. I have sometimes hastened the development of the bud by inserting the bud before cutting off the top, if the sap was flowing freely, and so soon as the bud was known to be living then cutting off the top. But this has been with trees standing apart from others. Where they stand thickly, as is generally the case in the wild grove,

the felling of the tops usually knocks out, or so disturbs the bud as to cause it to die.

As the young sour shoots start rub off all above and in the immediate vicinity of the buds. Allow a few shoots to remain along the trunk, but pinch them back after growing a few inches. Be careful to allow none to reach higher than the bud, as the tendency of the sap is to flow in greatest abundance to the highest point. I have already mentioned some advantages to be derived from first allowing sour shoots to grow and then pinching them back. I mention one other advantage. This method soon furnishes new and mature wood on which to bud if the first buds fail.

After the sweet buds have grown ten or twelve inches pinch back, simply taking out the terminal bud. So soon as the buds have started fairly a second growth, you may begin to lessen the quantity of the sour shoots below, until you can safely risk the tree's health with the foliage furnished by the sweet bud. You may have to occasionally pinch back the sweet bud. It is safest to hold it in such check as will hasten to *maturity* of wood and *thickness* rather than length of branches.

CHAPTER IV.

GROVES FROM TRANSPLANTED SOUR STUMPS.

The next most expeditious way of getting a sweet grove is from transplanted stumps of sour trees. It is sometimes the case that persons improving wild groves, having budded all the trees and finding them too thickly set on the ground, will sell those budded stumps at a fair price. When this is the case a grove can be brought into bearing in a short time. I have frequently had such trees to fruit the same year of planting. But this has been the case only where they have been taken up with great care, with abundance of root and removed but a short distance. But even where this early fruiting *can* be secured the policy is doubtful. The tree should not be taxed with efforts to bear fruit so early after its removal and in its enfeebled condition. It requires much greater effort on the part of the tree to bear fruit than to produce new wood. One of these budded sour stumps of medium size, carefully taken up with good roots and carefully cultivated, will begin the second year to bear considerable fruit, if it has not been allowed to fruit the year of planting. The third year such a tree will begin to pay a good interest on the investment of purchase-money.

There are some objections to a grove of this kind. These trees from old stumps never grow to be so large as the unbudded seedlings, nor bear so abundantly. They are believed, also, to be much shorter lived. European writers tell us such is the case, but I do not believe that our experience in Florida has been of sufficient length to test the age to which one of these trees will live and bear fruit. One other objection I will mention. It is generally believed that it is hard to make the old stumps live. The sad experience of those of us, who, a few years ago, bought such stumps by the hundred and had them die almost as fast as they were set, has made this kind of business very unpopular. But I am persuaded that most of this disaster can be attributed to ignorance and carelessness. I am satisfied now that if I had handled sweet seedlings, as I and every one else then handled sour stumps, the sweet seedlings would have died almost as badly. There

is no doubt that the younger the tree the less risk there is in removing it. But the early return to be gathered from these sour stumps, budded either before or after removal, will justify the risk in planting a few in every new grove, and if the stumps can be bought at a fair price and are near at hand, so as not to be damaged in transporting them, the grower would do well to plant them liberally. In transplanting sour stumps too much care can not be exercised.

Many of the wild groves are found in low wet land. The tap-root is small and the laterals near the surface, while reaching a considerable distance, have few or no fibrous roots near the base of the tree. They have also been accustomed to an abundance of shade and moisture. One must see at once that new and entirely different habits must be formed by such trees transplanted into a dryer soil and with less shade and moisture. These new habits have to be formed at a time whenthe tree is least able to bear the change. It is better to select trees grown in a dryer soil. I have, however, succeeded in transplanting trees from a swamp, at the time of taking them up, flooded with water. Some such are now healthy and fine bearers.

In taking up large sour trees have at hand a sharp axe, a sharp narrow bladed saw and two sharp spades prepared especially for such work. The spades should be made to order, narrower than usual, with handle and jaws sufficiently stout to be used in prying. With such tools the work will be greatly expedited and done much more satisfactorily. The time saved in one day's work with such tools will pay for their cost.

If ready to begin, saw off the top, leaving a stump five or six feet high to be used as a lever for bending the tree out of its bed. Now drive down the spade cutting the roots in a circle two feet and a half from the base or trunk. Shake the tree to see if all the lateral roots have been cut. If not it will be necessary to cut a trench the width of the spade to enable you to cut deeper. In making the second cut incline the point of the spade towards the tap-root. Next cut the tap-root two feet and a half from the surface and lift the stump from its bed. Place the stumps at once in the shade and wrap them well with wet, green moss. Protect as far as possible from the sun and drying winds. After taking a stump from the soil plant it in position as soon

as possible. One great cause of failure has arisen from keeping them out of the ground too long and allowing the roots to be exposed to wind and sun.

In setting have the holes freshly dug. Do not allow the soil to dry before it is replaced around the roots. Dig the holes, for resetting, five feet wide and ten or twelve inches deep. If the holes are dug too deep it is almost impossible to keep the tree from sinking too deep in its position, as the the fresh soil settles. In the center of the hole dig a deeper hole the width of the spade for the tap-root. With a sharp knife, and where the roots are too large for the knife, with a sharp saw with fine teeth, cut away all fractures and bruises from the ends of roots. So set the tree that it will stand, after the soil has been settled by showers, a little higher than it stood in its original bed. It had better be higher by two inches than lower by one inch than it originally grew. You cannot be too cautious at this point. If the tree is set too deep, it may live, but it will not flourish for some time. It may be not for years, but certainly not till it has sent out fresh surface roots to take the place of those which have been smothered by having been buried too deeply. The tree having been put in position, replace the soil, packing it first firmly around the tap-root. Now press down the ends of the laterals so that they will have a slight dip and fill in with soil, treading it firmly upon the roots. Finally cover over with two inches of light soil and leave the ground level. When the ground is sufficiently wet it is not necessary to use water. But if the ground is dry use enough water to settle the soil firmly around the roots, and especially around the tap-root, but do not wet the top layer of earth. I prefer planting after showers to using water. If the planting is done in Spring or Summer mulch at once with one or two inches of litter, and if the trees have been set in the open ground shelter them from the sun by setting a pine bough to the south of the tree. If the stumps have been taken from a dry soil the above is sufficient to insure their living, but if taken from a very wet soil, be careful to keep the ground moist till the new roots have well started and penetrated well into the soil. The stump should be cut off two and a half feet high. If the stumps have been budded and the buds have grown to considerable length, cut them back, leaving here and there a few leaves to direct

the current of the sap into the sweet wood. If the stumps have not been budded, so soon as the bark begins to break with new shoots and separate freely from the wood, insert three or four sprig buds near the top and treat the tree as directed in budding the natural grove. Fertilizers should not be added till the tree has well started.

CHAPTER V.

PLANTING THE ORANGE SEED.

In selecting seed for the nursery, if you intend budding the young trees, you need not be careful as to the quality of fruit from which the seed is taken. The plant from the sour seed, as already stated will, for a few years, grow more rapidly but make a smaller tree than the plant from the sweet fruit.

If you desire to grow your trees without budding select only from the best fruit, and from trees not grown in the vicinity of any trees bearing sour or indifferent fruit. All the varieties and even species of the *citrus* family mix very readily, and if grown in close proximity seeds from the same tree will give an endless variety of fruits, the tendency however being towards the kind produced by the tree from which the fruit is plucked, as the pistils are more apt to be fertilized by pollen from flowers near at hand.

If sour seed are to be planted the fruit may be thrown into piles till rotted and the seed washed out from the pulp. But whatever kind is used do not allow the seed to dry. Put them at once into moist sand, to be kept till ready for planting.

The seeds may be planted either in boxes or in the open ground or under glass as quantity or other circumstances may suggest. If fruit is eaten in the early winter the seed may at once be planted in boxes and the boxes set in some warm place indoors and the plants be so far advanced as to be ready to set in the nursery early in the Spring.

In preparing beds or boxes for seed have the bottom soil covered two or three inches deep with fresh leaf mold from the hummock. Place the seeds about one inch apart and cover with half an inch of soil—leaf mold. Finish by a covering of one inch of mulching and thorough watering. Keep the soil moist, but not wet. If the seed bed is in the open ground it is well to hold the mulching in place by laying a few brush on the bed.

I have sometimes succeeded very well by allowing the seed to remain in a box of sand till they have started to sprout and then planting them directly in the nursery. In this case select a place partially

sheltered by forest trees. Prepare the soil thoroughly for ten or twelve inches deep. Open the rows four feet apart and eight inches deep. Fill to within two inches of the top with well rotted muck, drop the seed three inches apart and cover with one and a half inches of soil.

In selecting a position for the nursery, if your place is well protected by water on the cold points, you may risk your nursery in the open field. But if you are not satisfied about the protection select a position sheltered from the morning sun to prevent the too sudden thawing after a frost. I would prefer shade on the south as well, as the sun sometimes breaks out suddenly during a cold snap about noon. Under such circumstances I have known serious damage done to young plants. A still better plan is to clear away a half or a quarter of an acre of ground in the midst of a tall forest. Around this half acre or quarter acre sink a ditch two feet deep in order to cut the surface roots of the forest trees. Plow or spade the land deep. Open the rows four feet apart and eight or ten inches deep, fill them with good muck or leaf mold clear of such litter as would attract wood lice. Over this muck place an inch or two of soil to keep the muck moist. A dressing of ashes or slacked lime will be of advantage, especially if the muck has not been previously well rotted in heaps. Your land can now stand till the trees are ready to be taken from the seed bed. Some prefer putting the muck, or whatever fertilizer used, broadcast over the land. But my reason for advising the muck to be put in drills is that if well rotted it will not heat, but will serve to keep the roots of the young plant in a compact body. A great deal is saved by this means when you come to transplant to the grove, the roots having grown in a compact body very little will be lost by root pruning. And where the distance from the nursery to the grove is short, and the transplanting is done when the ground is wet, the entire ball of muck may be taken along with and adhering to the roots and the tree hardly feel the shock of the removal. When the young plants in the seed beds are a few inches high and have four or five leaves, they may be transplanted to the nursery. In taking them up cut off the ends of the tap-roots so that they will not be apt to double up in setting them. The setting is better done in rainy weather. The ground should be thoroughly wet in order to insure a good result.

The rows can now be opened four or five inches deep and the young plants dropped at a distance of six inches apart. Let a hand follow and before the roots have time to dry set them in an upright position, carefully spreading out the roots and packing the soil around them. Be careful not to set the plants deeper than they grew in the seed beds. When a row or two have been set level off the ground with a rake, leaving the sandy soil on the surface and not the muck, as the latter hardens under the influence of the sun. If a shower does not follow soon it is well to water, in order to settle the earth well around the roots. If the sun is hot a little shade for a few weeks would be beneficial. Pine boughs can be laid over the ground, or palmetto leaves stuck along the rows. The nursery should be thoroughly worked and kept clear of weeds and grass and the soil frequently stirred for the depth of two inches.

CHAPTER VI.

BUDDING.

Where it is the purpose of the orange grower to bud his trees it is better that the budding should be done before the trees are taken from the nursery. The reasons are, 1st, the sooner in the life of the tree the budding is done the sooner and more thoroughly the healing of the wounds; 2d, the budding is done with greater ease and rapidity in the nursery than in the grove; 3d, in transplanting trees of considerable size it is impossible to take up all the roots, and, as it is necessary that the top should not exceed in proportion the roots in transplanting trees, it is beneficial to cut back the top considerably. If the budding has been done but a few months before transplanting the wounds will have healed and the proportion between the roots and top will have become about right for transplanting without the necessity of inflicting new wounds upon the branches at a time when the tree is in its most delicate condition.

A good time to begin to bud is when the trees in the nursery are one year old. By budding every alternate tree the budded trees can be set the following season, leaving greater space for larger growth of the trees left in the nursery. Those remaining can be budded when two years old and set the season following. Where trees are to be bought from the nurseryman it is preferable to plant trees older than one or two years, as older trees come into bearing sooner. But where persons are growing their own stock the sooner they are set, after the first year, in position, the more rapidly they will grow, if the trees are properly cultivated.

In budding nursery stock, but one plan, that of inserting a single bud, is practiced. The graft has not done well. Grafted trees will live, but they do not grow so thriftily as the budded tree. Grafting is sometimes resorted to when one wishes to preserve a new variety and he has obtained a cutting of this new variety in Winter when the sap is not in condition for budding. Sprig budding is not resorted to for nursery stock, as the stem is usually too small to admit the sprig. Do not attempt to bud except when the sap is flowing freely, so freely that

the bud will readily lift the bark as you push it downward into its position. The stock to be budded should be trimmed so as to have as few as possible branches or leaves in the way of the operator. The trimming should be done several days beforehand so that the wounds may be in a healing condition and the flow of sap not checked by too much cutting at the time of budding. The budding knife should be sharp that it will *cut* through the hard wood of the bud without splitting the fiber of the wood or bark.

Select buds from healthy and vigorous trees of the variety to be propagated. They should not be too old or they will be slow in starting, nor too young lest they perish. The wood from which they are taken should be nearly mature, between the angular and the round. Select buds with well developed eyes. It is sometimes the case that insects have eaten out the eyes. It is useless to put in such buds. In cutting the bud from the branch do not hold the blade of the knife at right angles with the branch, as in such a position it is likely to slip in and out following the grain of the wood and so giving an uneven surface to the face of the bud. The face of the bud should be so level and straight that when it is pushed into its position the cut surface should at all points touch the wood of the stock and so exclude the air. To prevent this irregularity of surface hold the blade of the knife firmly in the hand and almost parallel with the branch from which the bud is being cut. In cutting draw the knife to you as the cut will be smoother by this method than if the bud were severed from the branch by simply pressing the blade through the wood. The knife should be inserted half an inch above the bud and come out a half or three quarters of an inch below. It is better to insert the bud on the north side of the stock. The incision in the stock should be made with a downward cut and about three fourths of an inch long. At the top of this incision make a cross incision, each time only cutting through the bark. With the point of the knife, turning the back of the blade to the wood, so as not to dull the blade, raise the bark at the top of, and on either side of the first incision so as to enable you to insert and push down the bud. If the sap is flowing freely the bud in its downward motion will easily lift the bark and as it takes its position exclude the air from beneath it and the wood

of the stock. After the bud has been pushed partly down with the fingers, place the blade of the knife one-fourth of an inch above the eye of the bud and perpendicular to the line of the first incision, press the knife through the bark of the bud and by a downward motion force the bud down till the knife comes directly over the second incision. Tie in the bud with strips of cloth a quarter or a half inch wide, or, what is better, with strings of woolen yarn, as its elasticity will not allow the strangling of the bud so soon. In tying do not bring the cloth or string in contact with the eye of the bud. So wrap as to hold the bud firmly in its place and to exclude the rain if any should fall soon after budding. Revisit the buds 8 or 10 days after they have been inserted. If they are living take the wrapping from that part of the bud below the eye. The wrapping above the eye may be loosened but it should not be taken off so soon. Where the bud is living cut off the stock three or four inches above. As the bud grows it should be tied to this upper section of the stock for support. After the bud has started on its second growth, if the stock is small, it should now be cut off just above the bud, if larger a longer time should be allowed before cutting off the stock close to the bud.

Before leaving this subject attention is called to the importance of having the top of the bud fit neatly against the bark above. The law governing the growth of trees is this: the sap passing upward through the pores of the sap wood is elaborated through the leaf. It is only after the new sap has entered the leaf and absorbed carbon from the atmosphere that it is ready to make new wood. The sap having secured its carbon descends the tree mainly between the bark and the wood. As it descends evaporation is carried on through the pores of the bark, and the thickened sap makes a deposit along the line of its descent and around the trunk of the tree just under the bark. This thickened sap presently hardens into wood. It is this fact, that new wood is generally formed by this *downward* flow of sap, which makes it so important that the top of the bud should come in close contact with the *upper* bark. Placed thus it is put in contact with, and in the way of the direct current of life. Placed otherwise its hope of life is dependent upon lateral circulation or absorption.

CHAPTER VII.

IN SELECTING A LOCATION FOR AN ORANGE GROVE

Special reference should be had to Drainage, Soil, Water Protection, Forest Protection, Proximity to Fertilizers and Facilities for Transportation. The soil for a grove should be thoroughly drained either naturally or artificially. Not only should the surface water be carried off, but the drainage should be so deep as to allow roots, and especially the tap-root, to penetrate for several feet. Some think that less than ten feet is not sufficient. But there are in this State groves of fine old trees and good bearers with considerable less than ten feet of drained soil. The sour stock will flourish on a much wetter soil than the sweet. And it may be that these groves that have long done well in such localities are sour stocks budded. Where choice of location can be made, and especially if sweet stocks are to be planted, select a soil well drained by nature. Art and labor can accomplish a great deal, but it costs something and the effect is not so permanent as when nature has done the work. If no positive evil arise from a wet subsoil in close proximity to the surface, still there are reasons why a deep, dry, or moist soil is better. While it is true that the principal feeders of the orange lie near the surface, yet whoever will take the pains to examine the roots of an old orange tree grown in a deep and well drained subsoil will find that these roots have penetrated for many feet deep into the earth and in all directions from the tree. Now if trees have been set twenty feet apart in the grove and the soil is drained but one foot deep the roots of each tree have but four hundred cubic feet of soil in which to feed—20x20=400. But if the soil has been drained to the depth of ten feet, then the feeding ground for the roots has been increased ten fold and instead of four hundred cubic feet of soil in which to feed the tree has four thousand cubic feet—20x20x10=4000. This advantage is more especially to be considered where the subsoil is sandy, as in such a soil air and other nutriment for the roots penetrate to a greater depth. But there are some of these wet soils found in our State that are positively poisonous to the orange, as they contain a large per-centum of salt—*chloride of sodium.* Such is the case

with soils underlaid with "hard pan," a stratum, seemingly of dark sandstone, underlying, and generally but a few feet from the surface, many sections of our State. Analysis will likely show this "hard pan" to be a concrete of sand, iron and salt. The best surface indication of the presence of "hard pan" is an abundance of saw palmetto with an abundance of roots above the surface. The palmetto feeds largely upon salt, its roots containing an unusually large per-cent. But "what is fun" and life to the palmetto is death to the orange, as well as to the pockets of hundreds of those who have attempted in vain to grow oranges on lands underlaid with "hard pan." If your land has on it an abundance of saw palmetto with roots on the surface do not select that location for an orange grove until you have dug a few feet below the surface in search of "hard pan." If you wish to ascertain the depth of natural drainage revisit the hole twenty-four hours after it is dug, and measure the distance from the top of the water to the surface of the ground. This distance is the depth of the natural drainage of the soil.

The orange will grow in a variety of soils—in clayey, sandy, shelly or loamy soils; in hummocks black or grey, on pine lands or black-jack ridges. It does well on soil underlaid with clay or sand. It will even do well on a light soil underlaid with white sand if fertilizers are annually applied. But whoever wishes to plant an orange grove should be careful to select the best available soil. Perhaps the poorest soil suitable for orange growing is that underlaid with a white sand, as such a soil leaches very readily the soluble manure. Perhaps the best soil is found in our dark grey hummock with deep soil underlaid with a yellow clay or yellow sand subsoil. The natural growth should be tall and large with an abundance of live oak and hickory, as such a growth would indicate an abundance of lime. Of our pine land that on which the hickory is found mixed with the pine, with yellow subsoil, should rank first. Such a soil is really a mixed hummock and pine. Next to this is the pine, mixed with willow—oak and black-jack. Considering the ease with which such lands, as the last two classes, are cleared and planted, the readiness with which the orange grows on them, they deserve a high rank, and especially if fertilizers are close at hand. In selecting a location in the purely pine lands, select that

which is thickly set with tall trees, well drained and with a yellow subsoil. Such soils, if occasionally dressed with alkaline manures, grow the orange admirably.

While with proper care the orange may be grown successfully in almost any portion of the State of Florida, still it is wise to select a location which may combine all conditions favorable to the best results. Among the favorable conditions we would mention water protection. Whoever has traveled over the State, not by railroad or steamboat, but through the country, and noted the effects of frost here and there upon the orange trees, and especially at the close of a severe winter, must attach great importance to water protection. Its advantages were known to the old settlers, as witness their frequent advice to those, who in later years, have gone into the orange business. Its advantages were known to and made available by nature so far back that "the memory of man knoweth not to the contrary," as witness the many wild orange groves to the south-east of lakes and rivers. As our coldest winds come from the north-west, the benefit of water protection on any given location is in propoation to the width of the water lying to the north-west, and the proximity of such a body of water to said location. There may be seeming exceptions to this general rule. Air currents are governed by laws similar to those governing water. Hence, when any obstruction suddenly opposes a current, whether of air or water, an eddy or circular motion is given to the current. Bodies of timber with dense undergrowth standing on the north or north-west of a grove and along the shore of the river or lake have the effect of creating a rolling current of air like a breaker from the ocean rolling over a sand bar, and so, when the wind is from the north-west, bring down upon the grove a stratum of freezing air from above. The remedy for this is to clear out the underbrush along the shore and allow the warmer air from the surface of the water to flow through the grove. The taller trees should stand to break the violence of the wind from the orange grove and to check the violence of the air current upon the moist soil, which readily yields its moisture along with its heat to a strong air current and so intensifies the cold. It is regretted that some good locations along the St. Johns have been marred and groves made to suffer damage from want of attention to the above.

The above facts also account for the observation that the frost sometimes "strikes in spots or streaks."

Proximity to fertilizers is another favorable condition to be considered. The orange tree is a ravenous feeder and an abundant bearer, and however fertile the original soil may be, and even though it should be sufficient to produce fine trees and sustain them for a few years, any soil would finally become exhausted and need to be replenished. Commercial manures can be bought, but even when transportation is cheap the cost is considerable. The abundant and frequent deposits of muck in almost every locality have been shown by repeated experiments to be a valuable fertilizer. It would be well for the person looking for a location for an orange grove to have an eye to such a deposit close to the place for the intended grove. Leaves and ashes from a hummock close at hand, a shell bank, or limestone from which lime may be procured, should also be considered.

Facilities for transportation is the last item to be noticed in this chapter of favorable conditions to be considered in locating an orange grove. One other condition will be discussed in a separate chapter. The orange will bear transportation well, whether the expense of transportation, or perishableness of the fruit be considered. But it would be well for the reader, contemplating planting oranges, to estimate the cost of hauling say five miles by wagon or cart—an average crop of oranges grown on an acre, before he locates too far from a navigable stream or from a railroad. He can make the estimate for himself, and it will certainly have some weight in determining the location.

CHAPTER VIII.

THE ADVANTAGES OF PARTIAL FOREST SHELTER

Will be considered in this chapter. Its frequent discussion among orange growers, its importance to all, and especially its importance to many portions of the State where success must ever depend upon either forest or some artificial protection, demands careful consideration. Many persons have heretofore considered it unnecessary, and the idea even absurd. But years of experience and observation and especially the experience of the winter of 1876–7 have made many converts. Let the reader consider some facts that may be mentioned.

Wild groves have grown luxuriantly, have borne abundantly, and lasted, no one knows how long, not suffering, so far as the writer has been informed, even from the severe frost of 1835; and all under forest protection. Again, all through Florida in almost every old settled community and evenin the southern tier of counties in Georgia, there are a few old trees standing and bearing well and fine fruit. Hundreds seeing these trees have thought that what has been done once can be done again, and have planted in the same neighborhood of such trees, but unfortunately in the open field, or what is equally fatal, where the morning sun would smite the orange tree after a frost, and have failed. They have failed to consider that these trees that have survived so long and done so well, were planted in almost a dense forest when only a few forest trees had been cut to give place to the cabin of the early settler; or that they were planted on the north or west side of the house and thus never exposed to sudden thawing; that under some such protection of house or forest they passed through the tender age of their early life until their own boughs could furnish their trunks the protection needed. As to the questions of productiveness and thrift under partial forest protection they are settled by the success of the few who in the face of opposing theories have planted and succeeded. Some of the most thrifty young groves in the State, grown with less expense and equal to any of their age in productiveness, have been grown under the shelter of the pine or oak trees. Many groves one year ago in a most flourishing condition, and

supposed to be well located with reference to protection from frost, some far south and with considerable water to the north-west, were seriously damaged, and many trees beginning to bear entirely killed; but the writer has not heard of a single instance of damage to trees where they were protected by forest trees standing to the south and east of the oranges.

Even the lemon, much tenderer than the orange, was unhurt where so protected. One other instance. On the south or south-east of Orange Lake stood two beautiful and extensive orange groves side by side. They were wild groves budded and just coming into bearing. They both had the same water protection. One grove was judiciously protected by forest trees left standing at suitable intervals, the other grove was without such forest protection. All the forest trees had been cut down. A few days after the severe frost of the winter of 1876–7 the sheltered grove was still as green as in mid summer, while the other appeared as though a fire had swept through it. Its leaves were dead or fallen, while thousands of dollars worth of fruit, frozen and spoiled, hung upon the naked branches. The owner estimates that if he had left a few forest trees in his grove they would now be worth to him twenty thousand dollars. Are not such facts sufficient to check somewhat the reckless destruction of our noble forest trees and nature's chosen protectors?

In leaving trees for purpose of shelter for the orange the direction given in chapter third on budding sour groves should be attended to. Suitable trees at suitable distances should be left. Three things are especially desirable: 1st, the rays of the early morning sun should be kept from falling directly on the frosted trees. As the sun hangs far to the south during our coldest weather, tall forest trees on the south and east would materially benefit orange trees standing from one to two hundred feet from them. 2d, the rays of the sun should be permitted to fall, during some portion of the day, and in summer during a considerable portion of the day, upon each tree in the grove as the rays of the sun, direct or indirect, are essential to plant life and health. But in our sunny climate and long summers, shade and sun, alternating throughout the day, are found to be most favorable to many plants. 3rd, the roots of the forest trees should be kept out of the

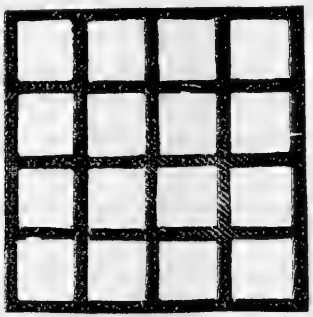
way of the principal feeders of the orange. Of course the orange trees should be as thoroughly cultivated as if they stood in the open field. Failures in forest culture—and there have been some abomina ble failures—have occurred only where these points have been disregarded.

The following plan is suggested as one to which it is believed no reasonable exception can be made. Select a forest of tall and thickly set trees, whether of pine or hummock. Clear out the under brush so as to allow a free circulation of air and to enable you to lay off more accurately your land. This done lay off a straight line as the base of operating. Allowing your land to be a plat of five acres lying north and south, let this base line run east and west fifty feet north of, and parallel to your southern boundary. Run a second line one hundred and five feet north of, and parallel to the first; so continue through the plat running these east and west lines at intervals between, alternating from fifty to one hundred and five, and from one hundred and five to fifty feet apart. Now begin on the east side, and fifty feet from your eastern boundary you can run your base line, perpendicular to your first base line. Go through the plat as before, alternating the distances between the lines from fifty to one hundred and five feet apart. You now have your land laid off in smaller squares of fifty feet and paralellograms of fifty by one hundred and five feet. The timber on these smaller squares and parallelograms is to be left standing. You have also a number of large squares 105x105 or about one quarter of an acre each. These larger squares are to be cleared of the timber and made ready for planting orange trees, and each square will be found to be surrounded on all sides by a strip of timber fifty feet wide. Around these squares, next to the timber, cut a ditch two and a half, or if you wish, three feet deep so as to cut all the roots of forest trees that would interfere with the orange. To prevent this ditch from draining the moisture from the grove fill it with the litter from the orange land and leaves from the forest. The next year clear out this ditch, use the rotten leaves as a fertilizer for your grove and fill the ditch again with leaves from the forest around. By this means you can have an endless supply of manure close at hand, you can have the benefit of the sun and the benefit of forest protection without any damage from the roots from the forest trees.

In sections where the frost does not fall so heavily these squares for the orange may be greatly enlarged. But for the northern tier of counties in this State, where there may not be sufficient water protection, the dimensions given are large enough.

With such a system as the above no man in Florida who has the soil and the timber need hesitate to plant largely of this valuable fruit, both for himself and for market.

In the cut below the dark lines represent the forest which has not been cut away, the white spaces represent the spaces cleared for orange trees.



CHAPTER IX.

TRANSPLANTING.

Before the work of transplanting begins the soil for the grove should be well prepared. It is most generally the case that the great hurry to get the trees into the ground causes much neglect at this point, but this policy is a bad one. The haste should have reference to the early fruiting and rapid growth of the tree; and they are not brought about by careless preparation of the soil. The soil should be deeply and thoroughly broken and the ground cleared of the roots. To insure the setting of the trees a proper and uniform depth the ground should be well leveled with harrow or drag. No manure should be used at the time of setting, nor before, unless applied some months before setting and thoroughly incorporated with the soil.

The best time for setting trees is the late winter or early spring before the new wood has started. The ground is then cool and the roots in as dormant condition as at any time during the year. It is better that the ground should be wet and the setting followed by showers. But wet soil is not so essential at this time of the year as it is when the transplanting has been done later and the ground and sun are warmer. If the work of transplanting has not been completed before the warm, dry weather of Spring has set in and before new wood has advanced far, it is best to defer the work till the frequent showers of August and September begin to fall. Good results sometimes follow Summer, Fall, and Winter planting, but these seasons are not so good as the months of February, March and April. One exception to this rule should be stated. Where trees are to be set under forest protection so that they will escape any damage from frost, the late Fall is the best time, as trees set at that time are well established and ready to start by the Spring.

In taking up the trees great care should be taken to prevent breaking or bruising the roots. As many roots as possible should be taken up. If the distance from the nursery to the site of the grove be short, and the nursery rows have been well manured with muck, and the ground is wet at the time of lifting the

trees from the nursery, much of the soil can be taken along with the roots. Immediately on lifting the roots from the ground they should be trimmed with a sharp knife wherever they are found to have been bruised or broken. The lower part of the tap-root also should be cut off to prevent its doubling up on being reset. Twelve or eighteen inches is sufficiently long for the tap-root. Put the tree under shade and cover the roots with wet moss as soon as possible. Do not allow the fibrous roots to dry, as they are very delicate and soon perish. Keep them protected up to the moment of setting, taking but one tree at a time from its covering of moss. To insure still further against damage to the tender roots, have on hand a half barrel of muck made into a thin paste and as fast as the trees are lifted and the roots trimmed, plunge the roots into this paste, take them out and wrap in moss.

The holes for the trees should be freshly dug. The work of setting is easily and rapidly done by three hands working together—one to dig the holes, one to prune and set the tree, and a third to fill in. The holes should be dug in the shape of an inverted saucer or truncated cone with about two inches of the top cut off. Proceed thus: Around the stake which marks the place for the tap-root, with a shovel or hoe take away the soil, letting the tool strike the top of the soil at the stake and continue to dig deeper into the soil until at a distance of eighteen inches from the stake it has penetrated six inches below the surface. Proceed thus around the stake until it is completed. This gives the greatest depth of the hole on the outer edge, or perimeter of the circle. Now take up the stake, cut two inches of the top off the cone. Where the stake stood, push down the spade by working it back and forth until it has penetrated the ground about eighteen inches, or the full length of the tap-root of the tree to be set. Now insert the tap-root in this hole made by the spade. Be careful not to set the tree deeper than it grew in the nursery. With the hand pack the soil firmly around the tap-root. Next spread the lateral roots over the cone, taking care to distribute them evenly over the cone. Throw on two inches of dirt and press it firmly with the feet. Finish by throwing in soil and leveling the ground, leaving the last layer of soil untrod.

Before the tree is left it should be trimmed with shears in proportion to the trimming done to the roots.

If planting is done in Summer or in hot weather and the ground is not protected by forest trees it is better to mulch.

If trees are older than three years, and wild grown, it may be necessary to dig the holes deeper than directed above, but the point of this caution is against deep setting. The writer is satisfied that more trees have been diseased and retarded in their growth and frequently killed, by deep setting than by any other one cause.

CHAPTER X.

THE DISTANCE APART

In the grove that trees should be set, depends upon the character of the trees to be set. The seedling should have the greatest distance, the sweet seedling budded less, and the sour stock budded least of all.

In Europe, where budding on sour stock is generally practiced and land is much higher than in this country, trees are set much closer than is the custom in Florida. In the former country, where set in the open ground, they are frequently put as close as ten or twelve feet apart, and where artificial covering during the winter is resorted to, still nearer. But in Europe orange trees never grow to the size they attain in Florida. In some of the old groves in this State where the trees stand forty feet apart the ground is completely covered by the branches of trees that have grown up since 1835. Thirty or forty years, however, is too long a time to leave the land uncovered. Trees planted nearer together will soon protect each other. Twenty-one feet apart is a good distance for budded trees and thirty for seedlings.

After the ground has been cleared off for the grove, stakes should be driven where the tap-root is to rest.

Where land is laid off in squares the following table will give the number of trees that will stand on an acre:

Distance apart.	No. of trees in squares.	No. of trees in diamond.
15x15	164	180
18x18	114	125
20x20	90	99
21x21	81	89
25x25	53	58
30x30	36	39

CHAPTER XI.

CULTIVATION.

The orange will live with almost no cultivation, but it will only be a sickly existence. I know no plant, shrub or tree, that will pay better for good cultivation; none, that will respond so certainly to thorough cultivation.

The ground in the grove should be kept level; the surface light As far as the roots have extended the surface should not be stirred deeper than three inches. The more frequently it is stirred the better. Beyond the reach of the roots it is well to cultivate deep and frequently, but as the roots extend themselves this area of deep cultivation should be lessened. After the roots have extended themselves well over the ground, the best plow to be used is the sweep. A single thirty-two inch sweep, or a gang plow, the middle or front plow twenty-two inches wide, and the two side plows, fourteen inches each, does excellent work. It is better than the turning plow or cultivator. The sweep is much more uniform in the depth of its cutting than either. It is much more rapid in its work than the single plow. It is more apt to cut off the weeds below the surface and destroy them, than the cultivator. With such an implement, a grove free from stumps and litter is easily and cheaply kept in fine condition.

While the orange trees are young, it is of advantage to keep the ground planted in garden crops—peas, beans, potatoes, tomatoes, anything that requires frequent work and will mature within a few weeks, partially shading the ground. Of course nothing should be taken from the ground without making adequate return in the form of manures. Suitable fertilizers will be noticed in a separate chapter.

Where the trees are planted far apart and ten or twelve years will elapse before the ground will be all occupied by the orange, grapes and peaches will do well and prove profitable, provided the soil is well drained.

At no time should the roots of grass and weeds be allowed to mat themselves on land growing the orange. Not only will they draw heavily upon the soil while they are growing, but when turned over the

turf and matted roots will necessarily leave the surface very irregular, causing the ground to dry rapidly under the influence of sun and wind. Some have advised cultivation to cease during August and September, alleging it to be better to allow the weeds and grass to grow after these months in order to check the full growth, and so allow the wood of the orange to harden as to resist the influence of frost during the winter. But the writer has experimented extensively and *expensively*—considering results—with the above policy, and where others were pursuing the same policy, he has advised them to try clean culture or garden crops on a part of the grove, and in every instance where the land has been kept thoroughly cultivated the trees have doubled, in size and thrift, those allowed to be left to the mercy of the weeds and grass.

Another result should be considered in this connection. Where grass and weeds are allowed to grow in the grove they are generally killed by the frost during the Fall or Winter. In this condition they absorb and part with moisture very readily, absorbing moisture when the atmosphere is warmer than the ground, and yielding it up when the atmosphere is cooler than the ground or the wind is blowing. But to part with moisture is to part with heat and increase the cold. In some sections of Europe, before the invention of ice machines, considerable ice was collected stored away and where the general temparature was only 40°. The freezing was induced by simply covering over lightly, and surrounding the ice ponds with wet straw. The wind passing through the wet straw took up from the exposed and larger surface of the straw its moisture together with its heat, and left the water to freeze. To leave any dry straw, weeds or litter on the ground during the winter, only intensifies the cold and invites the frost. The writer knows of several beautiful groves that were entirely frozen down from this cause, while others in the immediate vicinity were unhurt. Mulching during the winter has a similar effect. In this immediate neighborhood an old and beautiful orange tree was heavily mulched during winter. It was the only tree hurt by the frost in the grove that was hurt very badly, taking two or three years to recover. While the trees are young keep the grove clear of grass and weeds, Summer and Winter. If you mulch during the Summer, bury the mulching as the Winter approaches; dig holes and bury the litter.

In cultivating the grove with the plow there is a constant tendency of the soil to pile up around the trunk of the tree. This should be watched, and if the crown of the lateral surface roots is a half inch below the surface, from this or from deep planting, the soil should be drawn from around the trunk till the upper sides of these roots are brought to the top of the ground. If the upper parts of these roots are left bare, for one or two inches, where trees are five or six years old, and for a greater distance where the trees are older, these roots develop very rapidly and not only furnish stout braces to the trunk, but great arteries for conveying life and food from the soil. This point is so little understood and attended to by many cultivators, that it may be well to state further. This development of the crown roots is nature's plan when it is not interfered with. Whoever will visit and examine a natural forest, whether of orange or other trees, will find the top of the crown roots from one to several inches above the ground and running in many instances, as great braces, well up the trunk of the tree. This development of the crown, is slow at first, but increases in proportion as the upper surface of the roots lift themselves above the surface of the ground. This development can be hastened by taking away the earth from above the roots for a short distance from the tree, as mentioned above. The principle is the same as that adopted for the development of the bulb of the onion by taking the earth from around it. The root of the plant, being more porous than the stem, parts more readily with its moisture at the point where it is exposed, and hence the thickened sap lodges more readily at that point, and so hardens into wood and increases the growth. As the upward circulation passes only through the new or sap wood, this enlarged base furnishes, at the very seat of life and strength, new and increased capacity to the tree.

CHAPTER XII.

PRUNING

Is universally adopted by nature. In the forest all the branches of the little oaks and pines are near the ground. But as the trees grow these lower branches die and drop off. A few years later we behold thousands of graceful, well trimmed trunks. Where the oak grows up in the open field its method is to prune the inner branches and extend the surface, giving, what fruit growers call, an open head. The grape vine prunes itself. Where its branches are thickest the tendrils first strangle and then cut off some of the excessive branches. It is the Divine plan. "I am the true vine and my father is the husbandman. Every branch in me that beareth not fruit he cutteth away; and every branch that beareth fruit he pruneth it that it may bear more fruit." Wise is the man who will follow such teaching. Happy is the man who has a taste for such a work and can take up the vocation first taught man when "the Lord God put him into the garden of Eden to dress it and to keep it;" especially where he can dress a garden of this golden fruit—a relict of Eden—that is "pleasant to the sight and good for food."

It may be said "if nature prunes at all let her do it all." Yes and it may be said, "If nature plants and grows the corn at all why should I take the trouble to plant—and cultivate?" But such a man will reap little more than the harvest of his folly and indolence. Nature makes suggestions, but does not propose to do all the work where man's interest is especially concerned. Even before thorns and briars had sprung up, it was man's duty, and to his interest to "dress the garden" so perfectly planted. Again, where nature prunes, knots and dead wood often become the starting points for extensive decay. But where a living banch is cut off, with a sharp knife, from a vigorous tree the wound soon heals over, leaving no scar nor injury.

The writer has practiced on a grove of about 4,000 trees all the methods of pruning, and not pruning, to satisfy himself as to the best method. Nor has has he spared himself the trouble of visiting many of the best groves in the State, watching the operations of others,

and questioning them closely as to their practice and the results. He will not trouble the reader with the many theories advanced, much less with discussing them. A few essential points are all that is necessary to be attended to.

In pruning, the sharper the knife or saw, the better. Let the cut be clean and smooth. When the knife is used it is better to cut *up* than down; as the downward cut is apt to split the wood and peal off the bark. Do the principal pruning in the Spring. By all means avoid Fall or Winter pruning, as it is apt to start new wood at a time when it is most exposed to damage from frost Cut off all dead wood, and up to, or a little into the living wood. Thereby the wound heals more readily. As a general rule cut off all diseased branches; especially if they have become so far diseased as to fail to develop healthy leaves. Do not trim up the trunk too high. Encourage the lower branches to extend themselves well around the trunk and far over the surface of the ground. If they do not touch the ground they are not too low. As the tree grows these branches will continue to droop nearer the ground until the lowest may have to be cut off after awhile; but this late cutting off is much better than to have the trunk exposed either to sun or cold.

Give and keep an open head to the tree. To do this, select the most vigorous lateral branches, leaving some on all sides of the tree so as to obtain a head as uniformly balanced as possible. After cutting off the other branches close to the trunk, trim up these selected branches almost to a point leaving only a few of the terminal, smaller branches. When this is done, the tree will look like a skeleton and you will likely conclude you have used the knife too freely. But if this pruning has been done in the Spring and you keep the "water" shoots pulled off the trunk, and cultivate well, you will find the trunk by Winter enclosed by a beautiful head with a dense wall of foliage on the outside. The next Spring trim these laterals in a similar manner, allowing the first laterals to rebranch a little distance from the trunk so as to be able to fill up the larger area by Fall. Continue this method till your tree is large enough to bear its first crop. You can then slacken your pruning so as to encourage the fruiting.

There are several advantages arising from judicious pruning. Whenever a branch dies, it not only ceases to benefit the tree, but becomes a drain on its sap and vitality, as an ulcer to the human body. The same is true, to some extent, with a diseased branch. Moreover, as a branch begins to die, its fermenting sap is slowly taken up into the general circulation, and so the disease extends itself sometimes to the entire tree, unless it be cut off below the sound wood. This is especially the case when the frost has partially killed the young wood. The writer has known quite vigorous trees to be killed, not only to the ground, but entirely, by neglect at this point. The open head not only gives room for the free circulation of air through the branches, but also enables the gardener to watch the trunk and larger branches and remove from them insects that might prove damaging. Another advantage arising from the open head is, it causes the lower branches to extend themselves far out from the trunk, and so gives a greater bearing capacity to the tree. Trees in the grove of the writer pruned after this plan have doubled within two years, in their surface area, others standing by their side with the same treatment, except that the latter were not pruned.

CHAPTER XIII.

FERTILIZING

Has never been sufficiently appreciated in the South. Her broad acres have always tempted to planting too much land and using too little manure. Somehow when Northern men come South they, too, yield to the temptation and fall into the Southern fashion. And yet no soil responds more readily to the influence of manure than our warm Southern soil. The manure put by Peter Henderson on a single acre would be deemed by some Southern farmers ample for the broad fields of cotton stretching around his decaying mansion. A few men are wiser; they have ceased to fell the forest for more land and are contracting the planted area of the old land. They are endeavoring to increase their crops by manuring. Such men have succeeded and are still succeeding. Some I know have grown rich by such a policy.

No crop feeds more ravenously than the orange, and none will convert so large amount of suitable fertilizers into fruit so profitably. Much of our Florida land will produce and sustain fine trees for a few years without the aid of manure; but after some years of fruiting the leaves will begin to turn yellow and the fruit to rust, indicating a deficiency in the soil. Some of our lands considered poorest—black-jack ridges—in the vicinity of dwellings grow fine trees and continue to sustain fine crops of excellent oranges. But these trees so located are almost daily replenished with accidental deposits of nitrogenous manures, (the principal fertilizers needed on black-jack lands,) as well as considerable wood ashes and soot from the daily fires of the kitchen, and suds from the wash tub. The flourishing condition of these trees only shows the advantage of manures.

It is not safe to manure trees at the time of planting. In some instances this has succeeded very well, but only when the manure has been long composted and frequently turned, so that no fermentation will occur around the wounded roots. When manuring *will* be done thus early it is better to scatter it on the ground and turn it several times in the soil some weeks before the tree is planted.

After the tree has been planted and once started to grow it is then

well to manure it heavily till it begins to bear. Begin with a moderate quantity, applying nearer the outer extremity of the lateral roots and increase the quantity every year and enlarge the area to which it is applied. When garden crops are planted, scatter the manure broadcast. Aim to make the ground rich, rich as a city garden. It will pay for the manure and cultivation if the ground be planted and well cultivated in crops, and especially if planted in vegetables where a market can be readily reached. There are several advantages derived trom generous manuring when the trees are young; not only is the development of the tree hastened, but the tree is less liable to be attacked by some of the insects, and when attacked is better enabled to resist their ravages; and when in vigorous health, but is not making new wood during Winter, it is less liable to be damaged by the influence of frost. To prevent this last named evil, the tree should never be stimulated in the Fall or latter part of the Summer. It is much better to manure in the Spring. Another advantnge to be noted is, when trees are pushed before coming into bearing, the heavy manuring does no damage to the fruit. After trees have begun to bear it is better to manure heavily once in four or five years. Manuring bearing trees, and especially when the manuring is heavily done, has a tendency to make the oranges split and drop off the first year after manuring; and even when they do not split, the fruit for the first year is not so sweet and is more liable to rot soon after picking. To insure a good general yield and saleable fruit each year the manuring should be applied alternately to different parts of the grove, laying off the grove into four or five equal parts and manuring the first part the first year, the second, the second year, &c.

The kind of fertilizer to be used depends largely upon the character of the soil. If the land planted was originally heavily set in hard wood and the ashes of the wood, cut in clearing, has been scattered on the ground, it is more than likely that the soil for a few years will have a sufficiency of lime, soda and potash. In that case nitrogenous manures will be needed. But if all the hard wood has been taken off the land and no ashes left, such a soil will likely have become poor in calcareous manures, (as the readiness with which the pine springs up in our worn hummock lands shows) and should be treated as the

pine lands, and manures applied, containing all the elements of vegetable life used by the roots.

Some of the commercial manures are valuable when used in combination with other things, but none of them contain in right proportions all the elements needed for the orange. The writer has used and seen used a large variety of these fertilizers, and some benefit has been derived from most of them. From others no advantage has been discoverable. A good article of ground bone, where the oils and phosphoric acid have not been too generally expelled by burning; Peruvian guano, and potash, both the nitrate and sulphate, are very good when combined with muck. These are especially valuable when early vegetables are to be grown among the orange trees, as they highly stimulate the soil and hasten forward both the vegetables and orange trees.

Land plaster should be especially mentioned as beneficial to our sandy soil, as it not only furnishes an important element to the soil, but, in the absence of clay in most of our soil, furnishes a valuable absorber and retainer of the volatile manures so easily expelled by our abundance of sunshine. The writer thinks he has seen another advantage in the use of land plaster in the check which the sulphur, contained in the plaster, has upon some of the insects which damage the trees.

Green crops turned under are highly beneficial to young trees. Rye, oats, and barley sown in the Fall and turned under in the Spring and followed by one or two crops of cow peas during the Summer help forward a grove of trees wonderfully. It is still better if this be accompanied by a liberal dressing of wood-ashes. One ton to the acre is not too much.

Manures from the stables, cow-pens, hennery and pig-sty, indeed from every place where waste is deposited, should first be deodorized by the liberal use of land plaster or sulphate of iron—copperas—dissolved in water and composted with muck, and be carfully saved and utilized. As they are highly stimulating they should be composted with three or four times the quantity of muck, and frequently turned before using.

But of all the manures, that which is cheapest and most abundant is the muck to be found in our rivers, creeks, lakes and ponds. A

good article of muck is little less than decomposed vegetable matter. Leaves, wood, weeds and grass as they have fallen have been washed into these deposits and decomposed under water so slowly and so excluded from the atmosphere that they have lost little of their original elements. Here they have been preserved by nature, as in the crucible of the chemist, for ages, and now lie in rich and vast deposits for the use of the orange grower. Some who have supposed they were using muck have been mistaken. They have found a black sand with a little vegetable matter with it. If they had taken a little of it and washed it they would have found little else than sand, and some of it, that of a brown granular appearance, of a similar nature to "hard pan." Such a deposit is of no value, and that containing the brown sand actually injurious to the orange. Some who have used this kind of material have failed to discover any benefit and have cried out against all muck. But the time has passed for this. Too many have used muck and found it valuable for its merits to remain longer unknown. Where this deposit is close to the grove the most economical way to use it is to haul it at once from the bed and spread it broadcast over the ground and plow it in. It should not be allowed to dry in the sun, as it then becomes lumpy. If turned under the surface it soon incorporates itself with the soil. After it is applied and turned under a top dressing of ashes or lime would prove beneficial. If the deposit is some distance from the grove it is more economical to throw it into heaps near the bed, but under the shade, and still better to add a little lime or ashes as it is thrown in uniform layers. The pile soon heats and drys out leaving the muck as friable as a bed of sand. It is then very light and easily handled and carted. In this condition it can be used in almost any quantities; the only danger to be feared from excessive use is in piling it up so deep over the roots as to smother them for awhile. And yet if the crown roots are kept uncovered the surface roots soon find their way to the muck near the surface. The writer has had the orange roots to penetrate, for several inches above the general surface, a pile of muck left for a few weeks near a tree.

Before trees reach the bearing state they should be fed with nitrogenous manures; but after they have begun to bear

potash and kindred manures should be liberally used. Nitrogenous manures encourage the development of new wood and foliage, while lime and potash are necessary to an abundance of fruit.

The yellow leaves of the tree indicate a deficiency of nitrogenous manures, while the dark green leaves show an abundance. On the other hand rust on fruit shows an excess of nitrogenous manures, and the writer has found a correction of this in using the slacked lime, from burned oyster shells sown broad cast. The lime, in sowing, should be allowed to sift lightly through the branches and leaves of the tree. It should be applied before the trees bloom and when the foliage is dry.

CHAPTER XIV.

SPECIES, VARIETIES, &C.

Hitherto no mention has been made of any of the Citrus family except the sweet orange and the wild or sour orange—bigarade.

The methods of propagation and cultivation of all the family are so similar that no difference need be mentioned, except the fact that the citron, the lime and the lemon, are much more tender than the orange and need to be planted in more sheltered places.

Gallesio recognizes but four distinct species in the family: the orange, (sweet,) the bigarade, (sour orange,) the citron and the lemon.

He justly remarks as to the varieties: "The citrus is a genus whose species are greatly disposed to blend together, and whose flower shows great facility for receiving extraordinary fecundation; it hence offers an infinite number of different races which ornament our gardens, and whose vague and indefinite names fill the catalogues." Gray remarks: "The species or varieties are much confused and mixed." Reese in his quotations from authorities makes a similar confession. But if the species and varieties are so confused in Europe, where the classification of the citrus family has been principally discussed and where the multiplication of varieties has been somewhat held in check by their method of propagating the orange, mainly by graft or bud, what must be "the number of different races" which are to be found in Florida where the general method of propagating the orange is from seed?

At the late meeting of our State Fruit Growers' Association, a committee was charged with the work of naming our best marked varieties. They made a short report on the few varieties which came under their observation. But their work is not complete, nor likely to be for the next year or two. They are competent men, but their task is endless as well as important. Almost every community, where the orange has been long grown from seed, has some excellent and well marked variety. Some of these varieties vary greatly. Some ripen early and others late. Some have thick tough skins with finely flavored fruit and well adapted to shipping a long distance, while others are of such a delicate skin and pulp, they will have to be eaten nearer home.

Some are large and light bearers, while others are small and heavy bearers.

Many varieties differ greatly in color, from the pale orange, to a reddish orange and even to blood color. It would be well for those who intend planting budded trees, or propose budding trees now growing, to select the most excellent kind, whether they have yet been honored with a name or not, as it is the *quality* of the fruit and not the name which is needed. The name and classfication will come in time. Any new and remarkably good varieties ought also to be brought to the notice of the state committee, above named, on nomenclature. These gentlemen will do their duty, and Florida will be compelled to have her own nomenclature, as she has her own varieties.

The orange of Portugal and the China orange, are two well known varieties in Europe and are frequently seen in Florida, but have changed somewhat by having been reproduced from seed.

The orange of Portugal, or common sweet orange, is a tree growing to a great height when raised from seed. Its leaf is green, having a winged petiole, its shoots are whitish, its flowers entirely white and very odorous, though not equal in perfume to those of the bigarade.

Its fruit ordinarily round, is sometimes flattened, sometimes a little oblong. The rind, less than an eighth of an inch in thickness, is of a reddish yellow, and full of aroma; the inner skin is a sallow white, spongy and light. The sections, nine to eleven in number, contain a sweet juice, very refreshing and agreeable; its seeds are white and oblong, germinating very easily and reproducing usually the species with little change. There is a variety with no thorns; it is the race cultivated mostly by grafting, and is seen in all countries where this method of propagation is followed. In places where the orange is grown from seed, it is rare to find it deprived of thorns.

The China Orange is a variety excelling all others in the perfection of its fruit, of which the juice is the sweetest, the most abundant, and the most perfumed. The skin is always smooth, glossy, and so thin that one can scarce detach it from the pulp. This is characteristic of this variety.

The Red-Fruited Orange is a singular variety. Its appearance, its leaf, its flower, are all exactly like the common orange. Its fruit alone is distinguished by a color of blood, which develops itself gradually and like flakes. When the fruit begins to ripen it is like other oranges; little by little, spots of blood-color appear in its pulp; as it advances to maturity, these enlarge, becoming deeper, and finally embrace all the pulp and spread to the skin, which is, however, but rarely covered by

the peculiar color; yet this sometimes occurs, if oranges are left upon the trees after the month of May.

This orange is multiplied only by grafts, having few seeds, and those of little value. This is a proof that it is a monster; if it were the type of a species it would yield more seed and reproduce itself by seed. Its branches are without thorns, its fruit is sweet, but less so than the China oranges, and it has thicker skin.

It is cultivated largely in Malta and Provence. In Liguria, it is found chiefly among amateurs and seedsmen.—*Gallesio.*

So far as the Florida Fruit Growers' Association has determined, through their committee, the nomenclature of our own varieties is given below, and such should be authority among the growers in Florida.

Citron—Common.—Fruit very large; color that of ordinary lemon; rind and pulp white, and almost tasteless; tree vigorous.

Orange Citron.—Fruit somewhat cone shaped, more pointed than common variety; color that of an ordinary orange; rind cream-colored; pulp yellowish; rind sweet and highly aromatic; fruit possesses less bitterness than the common variety; tree a small, stiff, erect grower. For home use or commercial purposes this variety is in general cultivation.

Tangierine Orange—Synonyms, *Mandarin, Kid Glove, Tomato Orange.*—Size medium; much flattened; color dark orange; broad, irregular cavity, with stem obliquely inserted and surrounded by a knobbed eminence; eye set in a large depression one inch wide and five-sixteenths deep; longitudinal diameter two and a half inches; transverse diameter three inches; skin irregularly ribbed or lobed; color of flesh very dark orange; pulp adhering to skin by a few filaments; sections of pulp easily separated; pulp coarse; juice sweet and highy aromatic; aroma marked; quality first. Tree of original variety introduced by Major Atway, from Bayou Sara, La., and now growing in the grove of Dr. Moragne, at Palatka.

Dancy's Tangierine.—Size small; much flattened; color deeper and more brilliant than parent variety; longitudinal diameter one and three-quarter inches; transverse diameter two and one-quarter inches; the eye set in a deep cavity seven-eighths in diameter; stalk straight and inserted in a ribbed depression; thickness of the skin three-sixteenths; general properties of pulp same as parent, only superior; fruit nearly seedless. In flavor and external appearance this variety is superior to the original. Seminal variety of the Tangierine raised by Colonel F. L. Dancy, Buena Vista, St. John's county, Fla.

Citrus Japonica—Synonym, *Dwarf Orange.*—Dwarf growing variety; size of fruit small; slightly obovate; color deep orange; skin thin; eye set in a flattened depression; fruit regularly ribbed or lobed; longitudinal diameter two inches; transverse diameter one inch and seven-eighths; color of flesh dark; grain fine and tender; juice very acid. Useless, except as an ornamental fruit.

Navel Orange—Synonyms, *Umbilical, Bahia, Pernambuco, Seedless Orange, Embiguo.*—Size large to very large; eye presenting an umbilical appearance (from which it obtains its name); stem inserted in a shallow-ribbed cavity, with deep lines; skin three-sixteenths thick; longitudinal diameter three and five-eighths; transverse three and three-quarters; flesh very fine, melting and tender; juice sweet, sprightly, vinous and aromatic; quality first. Origin, Bahia, Brazil.

Citrus Myrtifolia.—Myrtle-leaved orange; fruit small and slightly flattened; eye set in flattened depression; leaves like those of the myrtle; flavor resembling that of a bitter-sweet. Fruit useless for table.

Sweet Seville, (Hicks').—Size small; slightly flattened; color comparatively deep; eye small, without depression; skin very smooth; thickness of skin two-sixteenths; longitudinal diameter two inches; transverse two and three-eighths; color darker than Navel orange; foliage differs from other varieties examined; leaves markedly obovate; average length about three and one-quarter inches; width about two and five-eighths; grain very fine, juicy and melting; juice very sweet and sprightly; quality best; a superior fruit in every respect except size. Supposed to be a seedling raised at Arcadia, St. John's county, Florida.

Arcadia.—Size large; form somewhat flattened; color deep; eye set in slight depression; stalk inserted in a slight roughened cavity; skin smooth with marked pits; thickness of skin three-sixteenths; longitudinal diameter two and three-quarter inches; transverse diameter three an a quarter inches; color of flesh deep; grain coarse; pulp melting; juice slightly sub-acid; quality good. Supposed seedling raised at Arcadia, and introduced by the Rev. William Watkin Hicks.

Bergamot.—Form flattened, with projecting nipple; color deep lemon; eye absent, and its place occupied by a nipple-like projection; stem inserted in a slight depression; skin two-sixteenths; longitudinal diameter through nipple three inches; transverse three inches; color of pulp nearly white; juice sweet and watery without any decided flavor; rind possesses a pear-like fragrance, from which perfumers obtain their bergamot essences. Only worthy of cultivation as a curiosity.

Nonpareil.—Size about medium; somewhat flattened; color ordinary; eye broad and set in a slightly depressed cavity; stem inserted in a level, scarred surface; skin three-sixteenths thick; longitudinal diameter two and three-quarters of an inch; transverse diameter three and a quarter; color of flesh ordinary; grain fine; pulp melting and tender; juice sub-acid and vinous; quality good. Seedling raised by Mrs. Mary Richard, Arlington river, Duval county, Florida.

Magnum Bonum.—Size large to very large; flattened; color light-clear orange; eye set in a slight cavity; stem inserted in a narrow depression; skin smooth and glossy; thickness of skin two-sixteenths; longitudinal three inches, and the transverse three and five-eighths;

color of flesh light; grain very fine, tender and melting; fruit very heavy and juicy; juice sweet, rich and vinous; quality best. Probably a seedling raised at Homosassa, Fla., the former residence of the Hon. Mr. Yulee.

Old Vini.—Size about medium; slightly flattened; color dark orange; eye broad, and set in a slight cavity; stem inserted in a narrow wrinkled depression; surface of skin rough; thickness of skin three-sixteenths; longitudinal diameter two and three-quarter inches; transverse diameter three and one-eighth; grain coarse; pulp melting; juice sub-acid and remarkable for a sprightly vinous property; quality good. Seedling raised by Col. Dancy, Buena Vista, St. Johns county, Florida.

Buena Vista—Synonym, *Sweet Seville.*—Size medium; slightly flattened; color dark crimson; eye set in a slightly depressed cavity; stem inserted in a slight depression; skin smooth, with deep pits; thickness of skin nearly four-sixteenths; longitudinal diameter two and three-quarter inches; transverse three inches; color of flesh very dark; pulp coarse, but melting; juice sub-acid; sprightly with vinous flavor; quality good. Seedling raised by Colonel Dancy.

No. 3 (Beach's).—Size above medium; form oblong; color light; eye set in flattened surface; stem inserted in a slight, wrinkled cavity; thickness of skin three-sixteenths; longitudinal diameter three and three-eighths; transverse three and a quarter inches; pulp coarse, not melting; juice sub-acid; quality fair.

Osceola.—Size large; slightly flattened; color bright; skin smooth and glossy; eye very small, and set in a slight cavity; stem inserted in small, shallow, wrinkled depression; skin three-sixteenths thick; longitudinal diameter three inches; transverse three and a quarter; grain coarse; pulp rather melting; juice sweet; quality good. Seedling raised by L. H. Van Pelt, Mandarin, Florida.

Dixon Orange.—Size large; somewhat flattened; color light; eye small, inserted in a slightly depressed cavity; stem inserted in deep, narrow depression; thickness of skin four-sixteenths of an inch; longitudinal diameter three inches; transverse three and a half; grain coarse; pulp not melting; juice sub-acid, without any decided flavor; quality second. Seedling raised on Indian river.

Sweet Seville (Tolman's).—Size below medium, but larger than Hicks's variety; form flattened; color light orange; eye large, without any cavity, and surrounded by a dark circle; stem inserted without cavity; skin smooth and two-sixteenths thick; longitudinal diameter two and a quarter inches; transverse two and five-eighths; pulp fine, melting, juicy, sweet; inferior quality to Hicks's variety. Origin, Mandarin, Florida.

Sweet Lemon.—Size very small; form much flattened; color rusty, greyish, yellow; instead of eye a marked nipple set in a deep cavity; stem inserted in a slight depression; thickness of skin two-sixteenths; longitudinal diameter two inches; transverse two and one-eighth; color

of flesh dark lemon; grain of pulp coarse; juice sweet and insipid, with slight lemon flavor. Curious, but unworthy of cultivation.

The Sicily lemon is well known in Florida and frequently propagated both from seed and by budding. But the fruit grown here is much larger than the imported fruit. It decreases in size as the tree increases in age.

The Messina is a smaller and finer fruit, also an earlier bearer and smaller tree. It is generally grown in South Florida.

"The lemon of Genoa is a vigorous tree, which will also extend itself *en espalier* (on a trellis), and bears an abundance of fruit. Its trunk, branches, leaf and flower are like other lemons. It has no thorns, and blossoms continuously from Spring till Fall. The fruit, usually egg-shaped, has a skin a little thick—sometimes smooth, sometimes uneven—and an abundance of sharp, acid juice. It is very generally cultivated upon the coast of Liguria, from Spezzia to Hyeres. It is the fruit of commerce by reason of its thick skin protecting it in its transit. It is multiplied by graft, but may be raised from seed." These trees (from seed), however, will nearly always have thorns. This variety is a very early bearer from the seed, and said to be of first quality.

CHAPTER XV.

THE INSECTS DAMAGING THE ORANGE TREE. THE NATURAL ENEMIES OF SUCH INSECTS AND THE REMEDIES TO BE APPLIED.

But few insects injurious to the orange tree have appeared, but their ravages have now and then done considerable mischief, and awakened still greater apprehension. The insect, which at one time was considered the most injurious, was the long scale insect, resembling one side of a distorted muscle shell, and was called by Packard, aspidiotus gloverii. When it first made its appearance in Florida, it threatened universal destruction of the orange groves. It first made its appearance at Mandarin, Florida, about twenty years ago, to which place it was brought on some China orange plants fresh ly imported from China. The insect is very diminutive, and under a glass of strong power, has the appearance of a white louse. It is very quick in its motions, (its movements resembling those of the chicken mite), and conceals itself, during the presence of an enemy, under the scale erected for the shelter, first of the egg and then for the young insect. The eggs are purple and laid in two parallel rows. The insect when hatched, at once begins to suck the sap—like the aphis—from the bark and leaf of the tree wherever the scale happens to be fastened. It finally develops into a diminutive fly undiscoverable with the natural eye, except when late in the afternoon they can be seen between the observer and the declining sun when the tree infested is suddenly jarred. The effect produced by their sucking is first to deplete, and finally to exhaust and kill the branch and leaf to which they cling. Several remedies have been found effectual. The most effective yet known to the writer is a decoction of tobacco with sufficient carbolic soap to make a strong suds. Apply with a garden syringe or pump, through a perforated nozzle. Kerosene, in the proportion of one part of kerosene to eleven of water, applied in the same manner is effective. But there is danger if too much be used. A moderate amount is a good fertilizer and stimulant to the tree As there is no chemical affinity between the kerosene and water, the mixture has to be kept vigorously stirred during the time of applying it. Either of these applications have to be repeated two or three times at intervals of ten or twelve days.

Another insect similar to the one just considered, but with scale of lighter appearance and of rounder form, is also damaging to the trees. This insect seldom attacks either the leaves or the tender wood, but confines itself mainly to the bark of the wood, from one to four years old. They are easily and effectively removed by washing the trunks with wood ashes and water in the proportion of one quart of ashes to three gallons of water. If found generally on the tree in positions not easily reached by the hand, syringe as before with "white lye"—lye prepared by boiling wood ashes.

A most formidable enemy to both these insects named, has appeared within the last two years in the grove of the writer. It is a lady bug with a single red spot on each wing case. In both the pupa and perfect state it is ever busy devouring these insects. Of course they are allowed full freedom of the grove, and are increasing very rapidly.

Another enemy, noticed for the first time and during the present year in the grove of the writer, of the long scale insect, has appeared in the form of a small hang or basket worm "named by Mr. Packard, (as the writer has been informed through the entomological department of the Agricultural Department,) Platoecitus Gloverii," but later named Psyche Confederata. The female remains in her case and devours the insects enclosed under her web. The male is a small dark colored moth. These insects are not a very formidable enemy to the scale, as the female confines herself closely in her operations under her web. But some small trees have been entirely rid of insects by their help. But if "these insects," as the entomologist of the Agricultural Department writes, "in their habits resemble the basket or drop worm of the North," they might prove an enemy to the orange tree as well as to the scale insect, and if so should not be encouraged.

Another insect resembling, when young, fine corn meal dusted over the tree, but when the case, in which the insects are enclosed, is full grown, it resembles the small barnacles clinging to the wharf built in saltwater. When these cases are turned over and examined with a glass, they disclose under each a multitude of small insects resembling lice. They do not exhaust trees so rapidly as the scale insect, but their presence is damaging. The leaves of the trees infested, after

awhile change to a dark sooty appearance, and the tree does not grow so rapidly.

An enemy to this insect also has appeared. I am informed by the entomologist of the Agricutural Department to whom I sent specimens of this and the other insects mentioned, that the "insect is the Evagoras Rubidus which destroys the plant lice on the cotton and orange, at least I have found it in the act of sucking out the juice of a plant louse." As I finished the above sentence I laid my pen down to go out and capture some of these insects that I might give a more accurate description, and found a full grown insect which had just pierced with his proboscis a full grown house fly. He continued his feast for a few moments as I watched, and when frightened retreated carrying his prey with him. This insect when young resembles a red spider. As it increases in size it changes to a salmon color with white spots. When half grown, or about one-half inch in length, two small black wings are visible. When full grown, or three-fourths of an inch in length, two pairs of wings show themselves, the smaller or under pair black, the upper pair black, with salmon colored marking on the forward halves of the wings. When fully grown the insect is ready for flight and is very active. When young it is very busy feeding upon *small* insects, when grown it seeks for larger prey. Since writing the above I find a description of the above insect in Agricultural Report of 1875, page 131.

The wood lice, or white ant, has occasioned serious trouble, and sometimes death to many fine young trees where the preventive was not used—ashes or slacked lime around the base of the trunk. When a tree begins suddenly to show yellow leaves examine a few inches below the surface at the base of the trunk for wood lice, especially if a stake has been driven near the tree for its support, or if litter from the forest or mulching of leaves has been used. If wood lice are discovered clear them away carefully, pour boiling water into the cavity around the tree until all the cavities in which the lice could have concealed themselves have been reached. If the tree has been but partially girdled it will recover, if the soil be placed above the wounded part. But if the tree has been completely girdled, get well rotted muck and pile it for three or four inches above the wound, and

cover over with sand. Finish with a top dressing of fresh wood ashes or slacked lime. If the tree is not too far spent it will send out young roots above the wound and finally recover.

Two other insects damaging to orange trees are to be noticed. These insects are very dissimilar in appearance, but the injury done by them very similar. One insect is a spider with a long slender body. When at rest its fore legs extend forward and the hind legs backward and all parallel with the body which clings closely to the branch or leaf on which the insect rests. In this position it would frequently be taken for a piece of moss or a rusty place on the bark. It is so very timid that it at once attempts to conceal itself in this crouching position on the approach of any person. This position not only enables it often to elude observation but generally to escape suspicion. I have watched it closely for two years and was very slow to believe that a so innocent looking thing could have done the damage universally found in its immediate presence. But I am fully satisfied that it is the cause of one of the forms of the disease known as the die-back. Early in the morning the insect is usually found on the tenderest shoots of the orange, and wherever found the indications are the same. If the shoot is very young and tender it begins at once to lose its freshness and ceases to grow, a little later it assumes a rusty appearance and finally dies. If the shoot is a little older when attacked or if the insect has moved lower down after exhausting the extremity of the shoot and attacks the stronger wood, a blister appears on the bark, and if examined, a collection of sap is found just under the puncture made by the insect, and between the bark and the wood. The sap soon hardens into a gum. If the sap is flowing very vigorously at the time the bark is punctured, a little sap flows from the puncture and hardens into gum. The branch is evidently poisoned by their operations, and frequently dies down to the wood of the previous growth. If the tree is abandoned to the insect the young wood is soon all killed. The young roots die with their corresponding shoots and the tree is greatly enfeebled. The tree makes, however, a desperate effort to recover, and starts from almost every leaf a new shoot. It is what the insects desire and they now begin to assail these young shoots in the bud. When attacked thus early they at once die and the bark of the

tree begins to assume a rusty appearance, the disease showing itself at the points where the young shoots made effort to break through the bark. I have never known a tree killed by the ravages of this insect, but it is useless so long as it is left to them. I know no natural enemy to this insect.

The one other insect to be noticed resembles the squash bug, and is called by the entomologist of the Department of Agriculture Euthoctha Galeator. This insect is very bold in its attack. I have watched them frequently in their operations as they were lying in the hot sun basking, while their probosces were inserted in the tender shoots. I have held my magnifying glass within a half or three-quarters of an inch from them and had the finest opportunity of observing the operations of this bold enemy of the orange. I have seen the tenderer shoots wilt, when the insect was sucking them, from the extremity to the point at which this insect had inserted its proboscis. As this insect is larger than the spider, the injury inflicted by it is much more speedy. But when the shoot is older and more vigorous the effect is very similar to that produced by the spider. Both these insects are more apt to attack trees starting young shoots at periods of the year when the grove is not generally making new wood. As they cannot pierce the old wood they seek for the tenderest. This accounts for the impression that *stimulating* or forcing a tree produces the die-back.

The Euthoctha Galeator is fond of concealing itself under litter of any kind during the night or cold weather. Mulching around a tree is an attractive covert from which they start forth, when the sun begins to shine warmly, to the nearest tender branch. This has caused others to conclude that *mulching* was the cause of die-back. But so far as the observation of the writer has extended the insects above mentioned are the main cause of this troublesome disease.

There is another form of this disease arising from an entirely different cause, to be noticed in the next chapter. As no natural enemies to either of these insects are known, watchfulness on the part of the orange grower is alone to be relied upon for their destruction. They should be caught by hand or in a net and killed. The insect last described is very apt to conceal itself under litter during the winter.

Pieces of bark, boards, logs, stumps, litter of every kind offer them shelter. In early Spring when the weather is cold everything of the kind in the vicinity of the orange grove infested, should be burned. The insect is very fond of sucking the cow-pea, and lays its eggs near its field of operation, often on the under side of the leaf of the plant on which it feeds. If the orange grower will grow cow-peas in his grove and bury them in trenches or holes dug at the extremity of the orange roots, a few days after these insects have commenced to feed upon the peas, he can destroy them at a most important time. Both these plans were adopted by the writer during the present year and his grove is now quite clear of this pest.

When trees have been damaged seriously by either of these insects the knife and saw must be freely used. Cut away all diseased wood. Let the cutting be so heavy that the tree will start strong shoots. Watch these young shoots carefully, in the early morning, for the spider, and when the sun is warm, for the bug resembling the squash bug. Kill all that make their appearance. If the extremity of the shoots have been stung pinch them back. They cannot be saved if the wood is very tender. If blisters appear in the harder wood puncture them with a knife. It will relieve the wood which will readily heal and the branch will soon recover its vigor.

The writer has allowed some trees to go almost to the last extremity and brought them out by following the above plan.

CHAPTER XVI.

DISEASES TO WHICH THE ORANGE TREE AND FRUIT ARE LIABLE, AND THIER REMEDIES.

Few fruit trees are less liable to disease than the orange, but the fruit and trees are so valuable that no enemy should be allowed to attack them unopposed. Perhaps the most formidable disease which has yet made its appearance is the "die-back." Two causes producing this disease have already been noticed in a preceding chapter. The name "die-back" is a general term, used for want of a better and more specific name or names, for at least two diseases arising from three and perhaps four different causes. But as it is descriptive of the symptoms of one or more diseases arising from several different causes, its meaning is readily comprehended. The symptom is the dying back of the new wood to the old. It is sometimes confined to a few branches of the tree. When this is the case the inference is that it is caused solely from the sting of an insect. If, however, the symptom is general to the young branches and they come forth, feeble and yellow with no marks of stings, the cause *may* originate near the roots.

Deep planting will produce such symptoms. Trees do not depend solely upon their leaves for the supply of carbonic acid. The roots gather a very considerable part of this gas, so essential to plant life, not in a pure state, as is done by the leaf, but in chemical combination with other elements. This is the case especially with trees which have very yellow roots. Such trees send their roots either into a very porous soil easily penetrated by the air, or else send them near the surface, where they find a greater abundance of air, which decomposes manure and is essential to the formation of carbonic acid. Such is the case with the orange tree and roots. If the tree is planted too deep or the crust on the top of the soil has become very compact, these roots, dependent upon air for health and ability to perform their functions, are virtually smothered. They make an effort to grow, but as often as they form rootlets and roothairs, these die and convey no nutriment for the formation of the *woody* structure of young shoots, so the new and tender cells, which are but the frame work of the plant, perish for want of support. And hence the light cellular structure in the forms

of young shoots die back as certainly as if they had been cut from the older wood. I have occasionally dug up trees so afflicted and found them wanting in new roots. The remedy is to reset, or else take away the top soil till the lateral roots are brought near the surface and to keep the soil well cultivated. The better plan is to take them up and reset them. Cut away all diseased wood and roots. When the extremities of roots of trees come in contact with poisonous earth a similar symptom is produced, as in planting upon hard-pan or over a stratum of salt earth.

Rust on the orange (fruit) has been a considerable cause of annoyance to some growers, because it mars the beauty of the fruit, though it does not affect its sweetness, nor its flavor. It is a disease confined exclusively to the outer skin. Whether it is a true rust or is simply an absence of the essential oil so abundant in the peel of the yellow fruit, the writer is not fully satisfied though inclining to the latter opinion. Fruit so affected has one advantage. It keeps longer than that enveloped in the lighter and more oily skin. The writer has had no difficulty in removing this disease. At different times and on different trees he has changed, in a single year, the color of the fruit from a dark-brown to a bright-yellow and smooth skin, by the application of slacked lime, from oyster shells, as before noticed. Whether the lime acts as a corrective of a disease, or whether its presence was needed in the soil for the perfecting of the fruit, or whether it absorbed carbonic acid and so furnished the additional amount of carbon necessary for the manufacture of the essential oil by the tree, the writer knows not. But the fact of benefit is not doubted.

Where moss appears on the trunks of trees, it is easily removed by any alkali wash. Soap suds, or what is better, wood ashes, will both fertilize and cleanse.

The cracking of the fruit is occasioned by any suspension of the growth of the fruit, and a consequent hardening of the rind followed by a sudden flow of sap from any stimulating cause, as highly fertilizing a bearing grove, especially during Summer, or a wet spell following a dry. This cracking is more apt to follow the rains, if trees have been highly manured even in Winter. This can be prevented by keeping the ground well stirred during dry weather. The soil thus stirred, absorbs moisture and keeps the fruit growing.

CHAPTER XVII.

GATHERING, PACKING AND SHIPPING THE ORANGE.

In Europe these branches of the business belong to the merchant, and are studied as an art. The merchant buys the fruit on the trees either in bulk or by the thousand, counting 1040 as an M. But in this country, and especially thus early in the history of orange growing, it is well for the grower to understand this part of his business so well that he can gather, pack and ship his own fruit without being left to the mercy of speculators, many of whom are concerned only so far as they may get the greater part of the profits. Ignorance of these things has already occasioned large annual loss both to the producer and buyer. The oranges from many groves have generally been *pulled* off, the rinds of many torn in gathering them from the tree and these oranges piled into a boat or cart and offered in bulk upon the streets or in the markets for sale. They have never been cured nor assorted. They are in no condition to be shipped. They cannot be long kept in such condition. The huckster or buyer sees this, takes advantage of circumstances, sometimes combining with others of his class to put down the price, picks out the most indifferent fruit and offers for the whole a price based upon this inferior sample. So far as the producer is concerned the fruit is sacrificed, and especially if the market be full. The grower should never put himself at the mercy of such men, for even the tender mercies of such men are cruel. If the grower will so gather, assort and pack his fruit that it will keep for weeks or for months, as may be done, he need not be driven to such sacrifices.

As the fruit of a grove begins to ripen, let the gardener pass through and taking tree by tree take from it all fruit that shows such defects as will lead him to conclude that it will never come to perfection. Let him gather all specked fruit. This can be done week after week, always selecting the ripest of such fruit. As such is the first to ripen there is always a market for it, and rightly managed, at a paying price. If such fruit is allowed to remain on the tree it will get no better, and its presence will damage the fruit which should remain

longer on the tree. Before the better oranges begin to ripen the gardener should be well acquainted with the quality of the fruit of each tree so that he can classify them according to quality of flavor, from the acid to the sweet, from the dry to the juicy and various varieties. In gathering cut the stem, leaving half an inch of stem on the orange. Place the different varieties in heaps to themselves. Cover lightly with straw for three or four days, the longer time during cold weather and the shorter time during warm weather, that the oranges may sweat. After this time place them in latticed bins, holding from one to two hundred oranges each, to dry. In putting them into bins assort them with reference to size, color and perfection, so that the classification may be complete. They can now be packed at leisure, for after they have been dried out without being bruised they will keep indefinitely.

The boxes for packing should be of light material, neatly made, tolerably close and hooped. Dimensions 8x16x27 with partition in the middle. In making these one side should be left open. In packing the open side should be turned up, and the box lined with sheets of paper laid on the bottom and resting against the side. Each orange should be wrapped separately in tissue paper containing as little oil as possible so that it will readily absorb and throw off moisture. The wrapper should be careful to reject every bruised or otherwise injured orange. The packer should be careful not to put different varieties in the same box. The buyer should know when he has tasted any orange from a box or brand that all others of the same brand or box are its equal. In packing, the oranges should be placed closely together in layers, so that there can be no rolling or sliding of the fruit in the box. The last layer should project three-fourths of an inch above the sides of the box so that the top when nailed on should hold the layers firmly to their places, even after there has been some shrinkage of the fruit. This is all-important when the fruit is to be transported a considerable distance; and especially when transported by rail. The box should now be marked with the number of oranges and the brand of the fruit.

In shipping, water transportation should be preferred to rail, especially during the first part of the trip, as such transportation is not

so apt to jar and rub the fruit as rail. When the producer knows a *responsible* merchant who will buy his fruit and sell it by retail, it is better for him to make the arrangement with him to furnish him oranges at a stipulated price for each brand throughout the season. It will lessen the expense of a commission to a third party; besides commission merchants as a class have not dealt fairly with the Florida fruit and vegetable grower. Bad packing, poor transportation and dishonest commission merchants have done more to keep back the progress of Florida and discourage fruit and vegetable growing than any other three causes combined. And of the three the dishonest commission merchant has made himself the largest but the lowest of these evils. There are some honorable exceptions, and such should be liberally patronized. But it is a vocation offering such opportunities for rascality and such bribes for dishonesty, it would be well for the producer to be cautious as to whom he makes consignments.

It is very much to be regretted that our mill men have been so slow to furnish suitable material for orange boxes. A great neglect at this point has caused some of our largest and wisest shippers to buy the material for their boxes in Maine and ship it to Florida; one party ordering a schooner cargo at one time. There is no necessity for this if the mill men will do a duty even to themselves. We have in the State an abundance of timber of the very best for such pusposes. Cypress for heads, and gum, or still better, magnolia for sides would make a light, durable and elegant box. Here we have abundance of this kind of material, indeed thousands of sticks of the two latter are annually burned to get them out of the way of the planter; and yet we have to send more than a thousand miles for planking to make a box for oranges.*

Transportation from Florida to the North and North-West is yet inadequate and the lines already in existence are badly managed; many of the officers on these lines have not done their duties to their employers and they have done much to discourage fruit and vegetable growing in Florida. This grave charge can be proven by a multitude of facts. A few should be mentioned to show something of

*Since writing the above Penniman & Co., of Jacksonville, have put up the machinery necessary for making suitable boxing.

their general character. Some crates of strawberries to be packed in ice and destined for New York, were thrown upon deck after the manner of a traveller's trunk. Remonstrance was made by the owner. "Got angel in dar?" was the ready reply of the deck hand, emphasizing his wit with an additional thump of the crate. The captain of the boat laughed at the wit of the negro and left him to repeat his damage and wit on the next victim who should take the pains to grow fruit for such fun. About thirty-three per cent. of the melons which are shipped from the St. Johns to New York never reach their destination. There is no excuse for this. The watermelon, well cared for and handled, will easily keep from six to ten days. A cargo of twenty thousand melons shipped from Fernandina to New York reached the latter port well cooked. Unfortunately it is not the fashion to eat cooked melons. What is needed for East Florida is a direct line of steamers from Jacksonville to New York. Such a line would not only pay the owners, but double many times the products of Florida in a single year. If it were known that such a line would be established early next Spring, thousands of acres would be plante in strawberries, blackberries, cucumbers, squashes, tomatoes, indeed the whole catalogue of garden vegetables; while during the Summer such a line would be kept busy carrying melons, grapes, figs, pomegranates, guavas, peaches, &c., already grown and wasted for want of transportation. The Winter would be an equally busy season with passengers, lemons and oranges. The boats of such a line would not come back empty but laden with such goods as we would be glad to get in exchange for our now wasted luxuries. That portion of the Great Southern Road projected, and the road bed already far advanced between Jessup and Jacksonville, should be completed at once to Jacksonville. West and Middle Florida should have direct communication with the North-west. That beautiful, rich and attractive country would in a few years become like the garden of the Lord. This is a seeming digression from orange culture, but it is pardonable, for while the orange is not so perishable as some other things needing transportation, the increasing production is such as will demand in addition to semi-weekly lines of steamers from Fernandina and Jacksonville to New York, a daily orange train from Florida to the North-west.

CHAPTER XVIII.

CROPS THAT MAY BE GROWN AMONG THE ORANGE TREES.

The question is often asked, "how can I make a living while the orange trees are coming into bearing?" The answer is "just as you would make a living if you were doing nothing else but farming or gardening, or growing fruits that come in bearing sooner than the orange." If you are a city clerk and know nothing about hoeing, and plowing and chopping, you would find it rather tough for the first year or two, to make your bread in the valley of the Nile, or your meat and bread in the blue-grass region of Kentucky. In either case you would have to deny yourself, for a year or two, of "luxuries" dear to you, among the most valued of these *otium cum dignatate*. You would have to pull off your coat and go to work. You would have to consult the natives to learn practical and common sense, and you would be surprised at the profound depth of your ignorance of the means of making the bread you have been eating all your life. But knowledge, even this humble knowledge, is good for the soul and the man. And you can learn, and even learn to love to work. The sweet sleep and refreshing rest under the soothing anodyne of labor would come without the learning. After awhile would come the noble independence of a *free man*. Try it, young man, try it! Come from the crowded city to the country! Come South, come to Florida! You will regret it for the first year or two, and apply hard names to your adviser, think him and his book a great humbug; but if you have the virtue of continuance, you will after awhile bless him for the advice, and your children will bless you for your wisdom. But from this digression to the subject in hand.

It has already been noticed that garden crops may be grown among the trees profitably to the laborer and the trees. Grapes and figs can be brought into bearing within three years from the cutting, and peaches in three years from the seed. Guavas can be grown under shade of trees in the latitude of St. Augustine, and abundantly and profitably further South. Plums do better in Florida than anywhere I have ever seen them grow. The Japan and wild goose plum will

bear transportation to Northern cities. They are both excellent fruits and bring a good price. Sweet potatoes can be grown in young groves. But as they require deep cultivation and to be planted in ridges, the rows should not run too near the orange trees. Sugar cane can be planted profitably, but should never be planted among orange trees. The smaller varieties of indian corn can be profitably grown among the orange trees, both for bread and forage. It is better however to grow it for forage, as it is not so exhaustive to land when cut in a green state. Indeed the names of crops that may be grown profitably, if the land is kept rich, is legion; as our climate and soil will grow almost everything that can be grown in the temperate zone, as well as all the semi-tropical plants. Sheep and poultry can be raised with great profit in Florida. In almost every neighborhood sheep will find an excellent range in the pine forest. They should be penned at night in the grove. For this purpose a movable pen of light boards four inches wide, the sections of twenty and sixteen feet in length, so that when sections are put together, they will be self-supporting, is a great convenience. The writer has one such which requires only a few moments to move, so that stock penned, can have fresh land on which to rest every night or two. It is a good way to fertilize a grove, if the pen is not allowed to remain too long in one place. A similar arrangement can be had for poultry, so that they can always be confined at the right spot. If too heavy to lift, they can be made to roll on wheels, made of sections of a round log.

CHAPTER XIX.

OILS, PERFUMES, EXTRACTS, &C. FROM THE CITRUS.

The subjects mentioned above need to be carefully considered by the orange growers of Florida. In Europe the manufacture of these products of the citrus is about equal in value to the exported fruit. Essential oil is distilled from the tender shoots, rinds of the fruit and leaves of the trees. The most delicate perfumes and oils are obtained from the flowers, especially from the flower of the wild orange. Marmalade is made from the sour fruit. Citric acid and concentrated lemon juice from the lemon, while the citron yields that most delicate conserve, bearing the same name, for which we pay high prices. Many of these delicate and truly valuble products of the orange can be prepared on the orange plantation at comparatively little cost. It would be better if some enterprising firm would locate at Jacksonville or some other orange center, and combine in one establishment all these interests. There would be no difficulty in obtaining ample material for a large establishment, even thus early in our orange growing. These materials—leaves, tender shoots, flowers, young fruit dropped, imperfect fruit and sour fruit would alone, if such an establishment were erected, pay for the cultivation of the grove and leave the fruit as a clear gain.

Such a business could be a source of vast wealth to the firm which would engage in it with sufficient capital and skill. These articles manufactured from the citrus would be put in a durable form and made ready for exportation to any part of the world. With this profit added to the profit arising from the sale of the fruit, at one cent for the orange and a half a cent for the lemon, the citrus crop in Florida alone could, in a score of years, be made to exceed the value of the entire cotton crop grown in the South. Florida certainly has a bright future before her if her sons are wise enough to labor for that future. In her broad acres there is ample room, not only for her natural and adopted sons, but for the hundreds of thousands of their fellow citizens to whom these sons of Florida extend a hearty invitation to come and occupy with them these broad acres, this genial climate and this vast wealth, enough for all, and quite as good as can be found this side of Heaven.

CHAPTER XX.

CONCLUSION.

To those who are thinking of engaging in this important branch of industry, I would say a few words in concluding. It is evident that Florida is destined to take the lead as a fruit-growing State. Land is rapidly increasing in value. The sooner you buy the better. But before purchasing, learn all you can of the different portions of the State. If possible travel over it with an eye to finding that section which will best suit you, so that after locating, you will never be made to regret your first choice. Each portion has its advantages. Middle Florida has fertile soils, and with its rolling lands, is perhaps, the most beautiful section of the State. The orange has received too little attention in Middle Florida. Those who have made the attempt, with proper care and protection, have grown fine oranges there.

The country through which the St. Johns River flows, having at once one of the grandest streams in America, and with it ample facilities for transportation, has, as yet, attracted the most attention. The eastern shore of this river, especially, is admirably adapted to the culture of the orange. Being protected from the severe north-westerly winds by this wide expanse of water, it is as little liable to the injuries of frost as counties one hundred miles further south. The counties in the lower portion of the State have generally fine lands, and grow the orange successfully.

Having settled, plant your grove of one or more acres; let the size be determined by your means, never undertaking more than you can keep in the highest state of cultivation. As to choosing between the budded and seedling tree, decide as you wish fruit sooner or later. A budded grove would perhaps best suit a man well advanced in age. If, however, the seedling is your choice, make yourself entirely satisfied as to the quality of the orange from which the seed were taken, and also the remoteness of the original tree from trees bearing fruit of poor quality. Better plant the seed yourself and wait, rather than have doubt on this point. Keep the land rich and *thoroughly* tilled. The best remedy for drouth, is to have the plow and cultivator or sweep

continually going. It is a great mistake to plow only with respect to the grass. The intervals between cultivating should not be so great as to give the grass an opportunity for growing. Where the ground is frequently stirred there will be fewer insects, their eggs which are often deposited in the earth not being permitted to hatch. Examine your trees often and closely. If insects attack them treat at once. Study your soil, note what it is deficient in, and supply the deficiency.

Your grove having come into bearing your toil is over and your fortune made. You can now have the pleasure of eating this most healthful of fruits of your own raising. An eminent physician has said that if each of his patients would eat an orange in the morning before breakfast, his practice would soon be gone. If France is sought by the invalid for the grape cure, Florida will be resorted to for the orange cure as well as for its unrivalled climate.

Do not be afraid of glutting the market with the orange; it can never be done. There are thousands of persons who have never seen an orange and many more who have to pay exhorbitant prices for them where they are rarely seen. If there is a supply the demand will be created. When Florida's oranges are counted by the hundred million, she will have adequate means for transporting them to the best markets and to *all* markets, without a doubt. The people of this country know very little about eating the orange. They have not yet acquired a taste for this queen of all fruits.

If the orange growers of Europe find it profitable to send their indifferent fruit to us, after having to pay a tariff, (for which we are indebted to General Sanford of this State), how much better can we afford to sell at home, even for the same price.

The above named gentleman, after his tour through the orange growing portions of Europe, states that they claim to be able to raise the orange profitably when getting only one dollar per thousand; their average price now being about three dollars per thousand. Is there any probability of the luscious Florida orange being reduced to this price, even if her market be restricted to the limits of America? But the day is not far distant when our oranges will be found on the tables of the rich in Europe in preference to the inferior fruit they now get there.

The orange grower should not be contented with his *present* knowledge. This is a progressive age; orange culture is in its infancy. If we would keep well posted we should study our vocation no less diligently than others do theirs. The papers of the State have done much good in this direction, giving the successes and results of experiments of different men. Every orange grower should take the paper published in his own section; these papers should have a department devoted specially to fruit growers, who should make it a repository for mutual information.

Finally, to be successful, the fruit grower must watch and work; but not always, for soon golden harvests may be had for the gathering.

TREATISE

AND

HAND BOOK

ON

ORANGE CULTURE

IN

FLORIDA,

BY

T. W. MOORE,

FRUIT COVE, FLORIDA.

JACKSONVILLE, FLA.:
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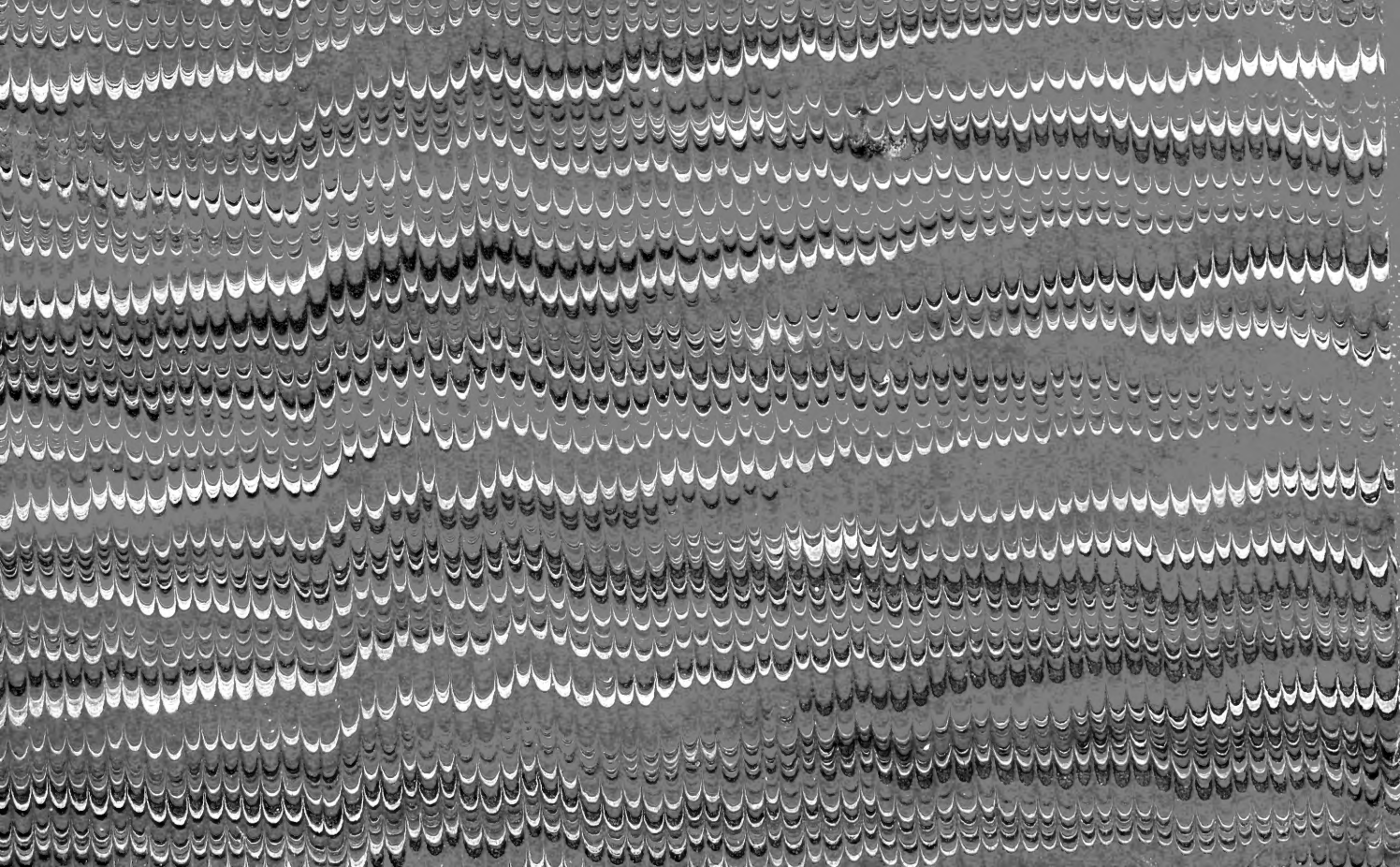

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